Rock Products
With which is Incorporated CEMENT and ENGINEERING NEWS Founded 1896

Volume XXXIV Chicago, March 28, 1931 Number 7

Only Active Cement Plant in Arkansas

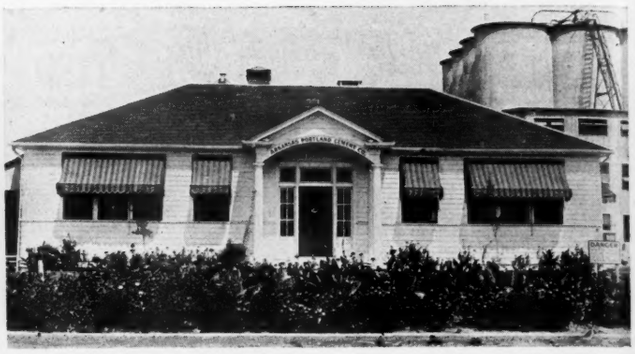
Arkansas Portland Cement Co.'s Mill at Okay Perhaps the Most Up-to-Date Wet-Process Plant in America

By J. F. Kaufman
Superintendent, Arkansas Portland Cement Co., Okay, Ark.

THE ARKANSAS PORTLAND CEMENT CO. is the only operating cement plant in the state of Arkansas. The company is a corporation organized under the laws of the state of Arkansas, and is a subsidiary of the Ideal Cement Co., of Denver, Colo., which operates the following other plants: Colorado Portland Cement Co., at Portland, Colo., and at Fort Collins, Colo.; Nebraska Portland Cement Co., at Superior, Neb.; Union Portland Cement Co., at Devils Slide, Utah; Three Forks Portland Cement Co., at Trident, Mont., and at Hanover, Mont.; Oklahoma Portland Cement Co., at Ada, Okla.

The idea of building this plant originated with Charles Boettcher, of Denver, Colo., president of the company. The broad vision which has enabled Mr. Boettcher to develop the Ideal Cement Co. and other interests enabled him to see the future of Arkansas and the advantage of building a cement plant in this state. Mr. Boettcher was aware of the plans made by the state for extensive road building, and, coming to Arkansas personally to investigate, he was so interested in the state and its progress that he requested M. O. Matthews, local manager of the Oklahoma Portland Cement Co., to explore the state for possible deposits of cement-making materials. Mr. Matthews made quite an exhaustive study of the resources of the state and, after a very thorough search, he discovered that the best raw materials existed in a chalk deposit in the southwest part of the state.

This chalk deposit was explored and examined and several possible plant locations were considered. The present site was finally selected because the raw materials found were perfect for manufacture of high-grade cement. The chalk and clay deposits were found together in the most advantageous shape for quarrying, and the commercial features, such as transportation, providing accessibility to market,



Entrance to plant, and the office building

power, and natural gas for fuel, were found to be within easy reach of the proposed site. On account of the isolated location of the plant it was necessary to select a site upon which could also be built an industrial village, not only to house the builders of the plant, but the permanent operating personnel as well.

The plant site was located approximately 30 miles northeast of Texarkana, adjacent to Hope and Nashville. Both towns lie within equal distance of the plant.

One of the first undertakings of Mr. Matthews was to acquire the controlling interest of the G. N. & A. railroad. This was a short line extending from Nashville to Ashdown, connecting with the Kansas City Southern and the Frisco at Ashdown and the Missouri Pacific at Nashville. The plant site was located about 4.8 miles from the closest point on the G. N. & A. railroad. It was then necessary to build a spur from this line to the proposed plant site. This extension was pushed as fast as possible in order to transport construction materials and the machinery to the plant site.

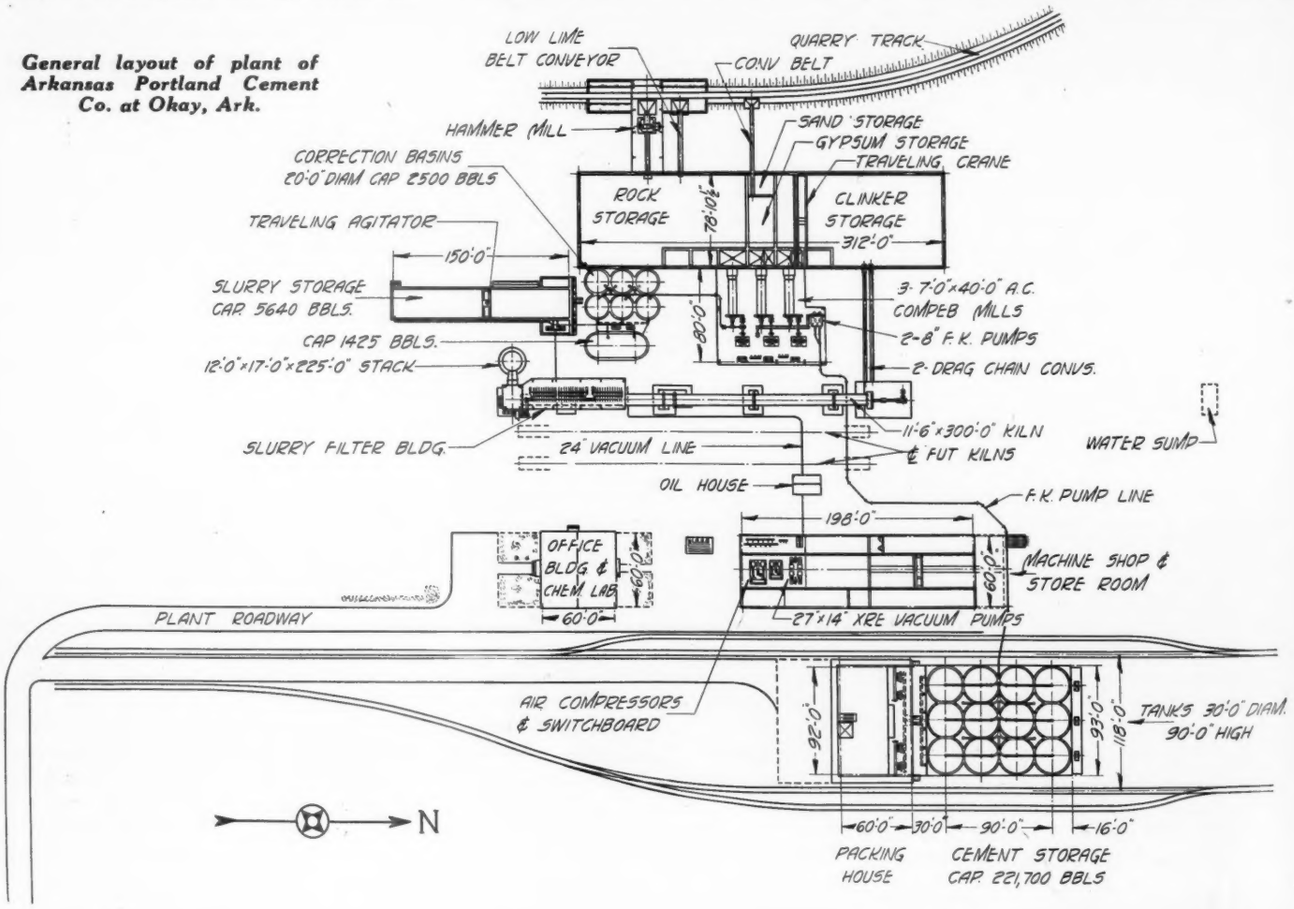
Quarry

The extensive core-drilling operations carried on under the direction of Mr. Matthews had proven that the necessary limestone was in abundance, and further drillings proved that there was sufficient raw material to justify the construction of a modern, up-to-date cement plant. The rock deposit proved to be of cretaceous chalk. The low lime material or clay was found in the form of argillaceous loam.

In opening the quarry and through present-day operations an Armstrong No. 50B, all-steel blast hole drill was used.

On account of the plant being located adjacent to bottom or overflow land, it was necessary to maintain the quarry floor above the overflow elevation. This limited the depth of the quarry face, as it was not deemed advisable to open up the quarry below high water, which would necessitate pumping from the start. Although it is possible at some points, especially in Alabama, to handle the chalk without blasting, it was found necessary on this deposit to drill and shoot the same as in the harder limestones. However, it has been proven that 30% dynamite has

General layout of plant of Arkansas Portland Cement Co. at Okay, Ark.



General view of quarry development, with tracks designed for remote control of cars

sufficient strength to take care of quarry blasting. The chalk has a tendency to disintegrate when exposed to the weather, and large blocks rapidly break up under this condition.

The equipment for loading the high lime material or chalk is one Marion Type 480, 2-cu. yd. electric revolving shovel, mounted on crawlers. For handling the low lime or the clay, a Bucyrus-Erie, gasoline-air shovel, Type GA2, is used. This shovel is equipped with a ¾-yd. dipper. Under present operating conditions the ratio of the low lime to the chalk is about 10 to 1, so that with the adequate raw material storage it is not necessary to operate the low lime quarry only at certain intervals.

Transportation

During the development of the quarry and for the first period of operation, a steam locomotive with Easton 6-cu. yd. cars were used for transporting the raw material from the quarry to the crusher. After the quarry had reached a certain

Quarry transportation by remote control electric system

Synopsis

***THIS STORY** is unusual in that it is written by the man partly responsible for the design and construction, and wholly responsible for the plant's subsequent operation.*

It is one of few American cement mills using chalk as raw material.

It has one of the largest hammer mills for a primary crusher.

The finished cement is distributed to silos by pumps which are push-button controlled from the laboratory.

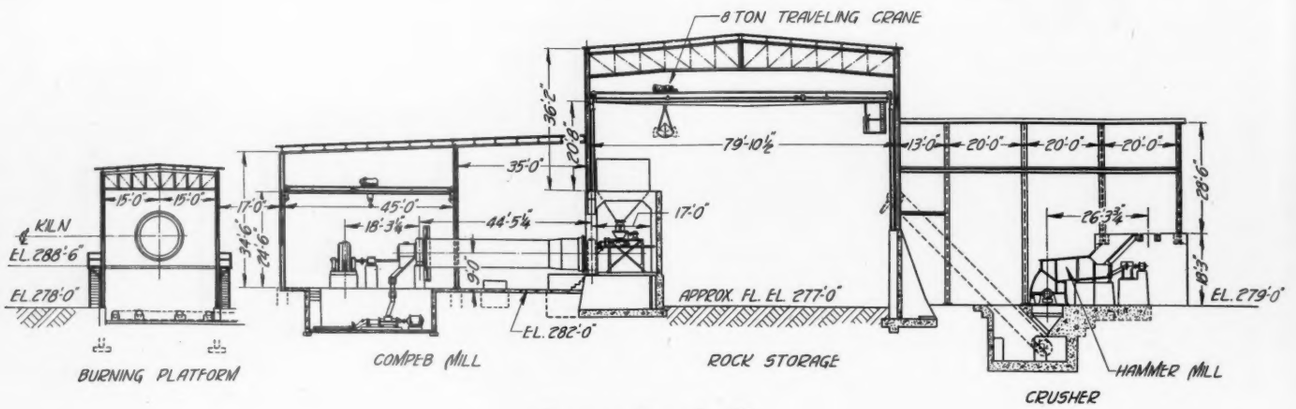
The mill building is designed to provide for closed-circuit grinding when and if desirable.

Slurry filters were provided for in the design but not installed until after a year's operation.

Raw material is ground to 92% through 200-mesh, with 48 to 50% moisture content.

Hot water, heated in a coil in the kiln stack, is used, thereby increasing the filter capacity.

One kiln with special details for feeding and breaking up the slurry cake produces 3000 bbl. of cement per day.



Cross-section of mill

development, the Woodford centrally-controlled electric haulage system was installed. This consists of three cars with suitable passing tracks, which make possible the handling of from 1800 to 2000 tons of raw material per day. This system has been in operation now for several months, and owing to its efficiency the quarry is operated on a 10-hour basis.

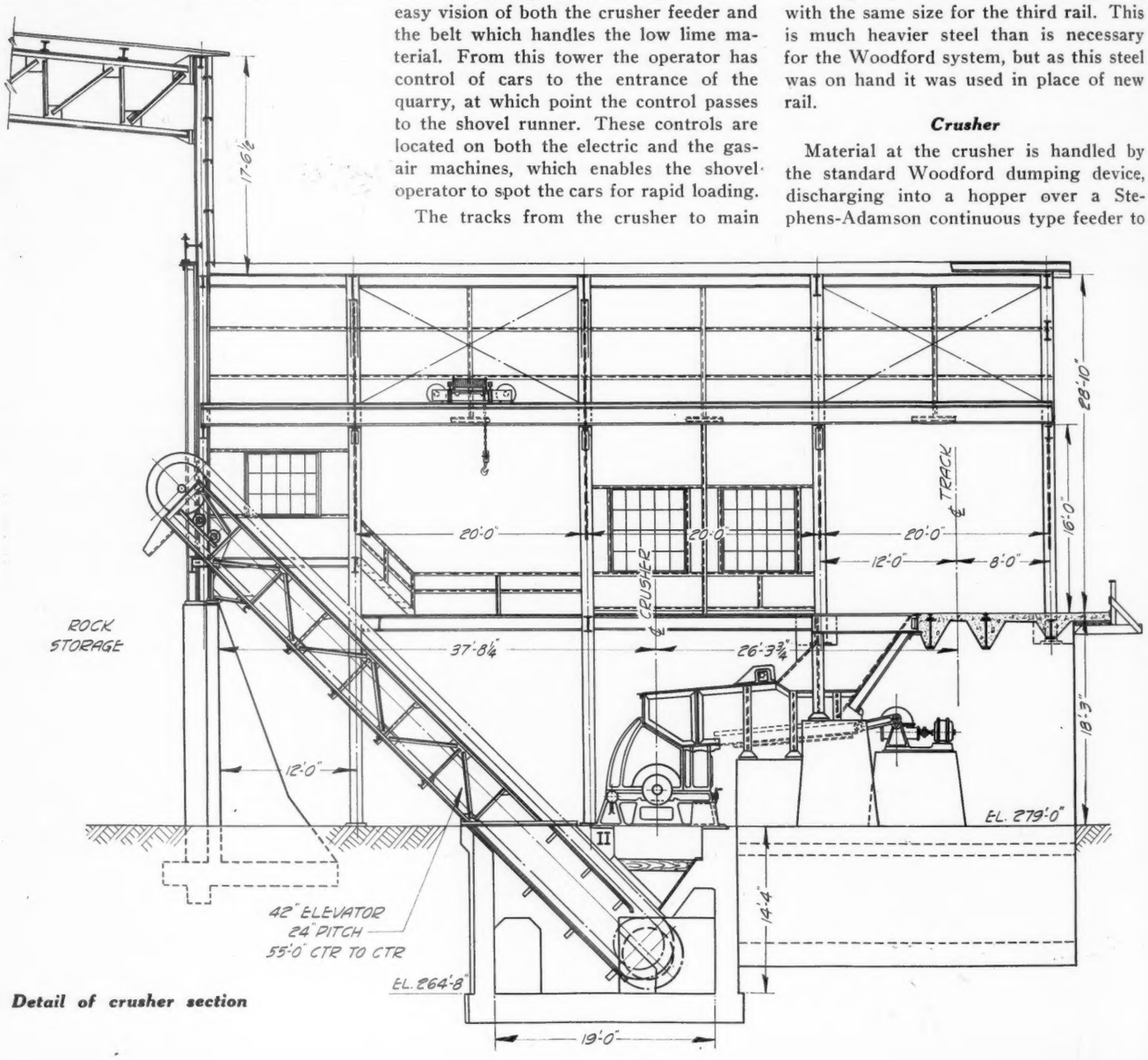
The main control tower for handling the Woodford system is located at the crusher building, where the operator has easy vision of both the crusher feeder and the belt which handles the low lime material. From this tower the operator has control of cars to the entrance of the quarry, at which point the control passes to the shovel runner. These controls are located on both the electric and the gas-air machines, which enables the shovel operator to spot the cars for rapid loading.

The tracks from the crusher to main line and machine shop are electrified, so that a certain amount of yard switching is possible. Gypsum is handled in this manner from the main line to the point of unloading.

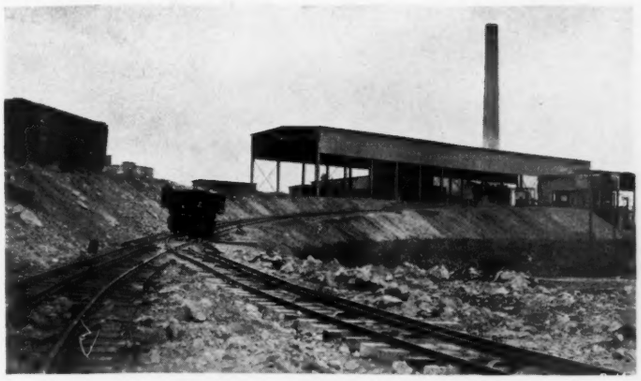
All quarry track is 60-lb. relay rail, with the same size for the third rail. This is much heavier steel than is necessary for the Woodford system, but as this steel was on hand it was used in place of new rail.

Crusher

Material at the crusher is handled by the standard Woodford dumping device, discharging into a hopper over a Stephens-Adamson continuous type feeder to



Detail of crusher section



Approach to crusher on 6 1/2 % grade

Storage for raw material and clinker

a Pennsylvania Jr. hammer mill size No. 58. This mill has a hopper opening of 66x48 in. and is capable of taking all rock that will pass through the 2-yd. dipper. This crusher is driven by a 400-hp. motor and has a rated capacity of 350 tons an hour. The installation of this type of crusher was quite noteworthy from the fact that it was the first crusher of this size built by the Pennsylvania Crusher Company.

The crusher breaks down the material so that practically all will pass a ¾-in. ring. The material is elevated from the crusher by a Link-Belt 42-in. bucket elevator, inclined at an angle of 45 deg., having a maximum capacity of 500 tons per hour. The material is discharged from this elevator into the open type storage structure served by a Milwaukee traveling crane equipped with an Owen bucket of 3 cu. yd. capacity.

The low lime material or loam is handled by a 30-in. belt conveyor which discharges into the same storage structure. This belt parallels the inclined elevator and is equipped with the same type of dumping device to handle the Woodford cars as is installed at the crusher.

Raw Material and Clinker Storage

The raw material and clinker storage structure is of the open type design equipped with a Milwaukee crane of 8 tons capacity, with an Owen 3-cu. yd. bucket. The crane has a span of 76 ft. with a 50-ft. lift.

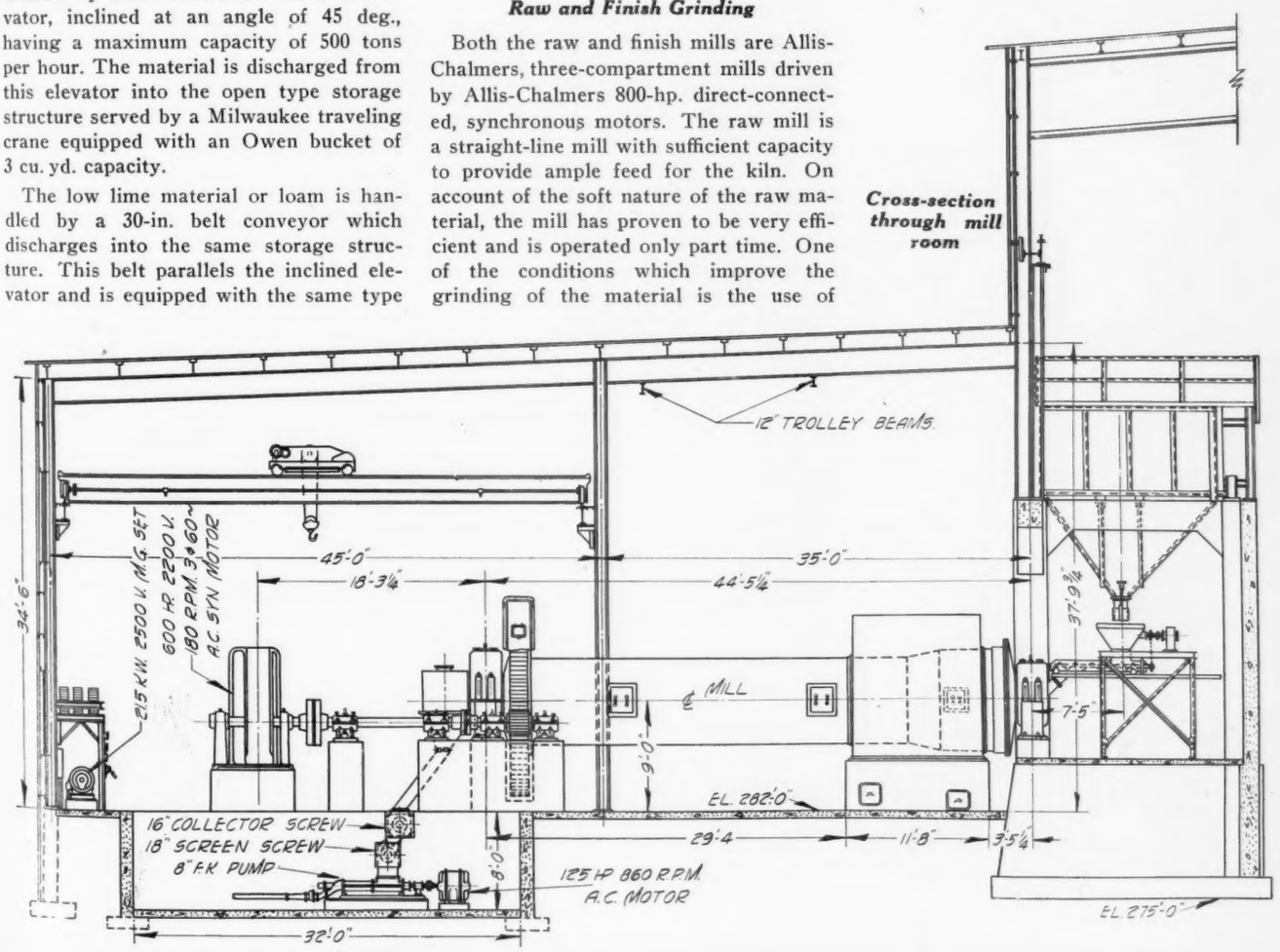
This structure houses not only the high and low lime, but the gypsum and clinker storage, all of which are handled by the one crane and one operator.

Raw and Finish Grinding

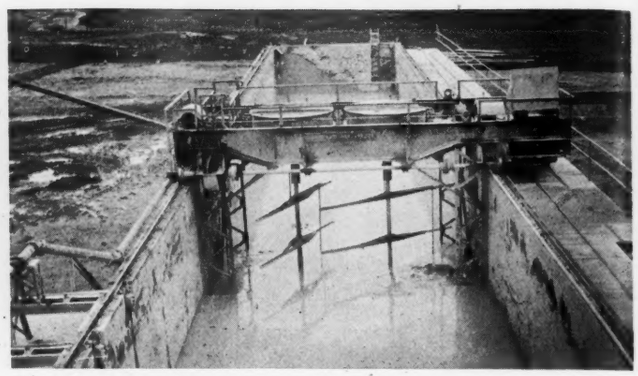
Both the raw and finish mills are Allis-Chalmers, three-compartment mills driven by Allis-Chalmers 800-hp. direct-connected, synchronous motors. The raw mill is a straight-line mill with sufficient capacity to provide ample feed for the kiln. On account of the soft nature of the raw material, the mill has proven to be very efficient and is operated only part time. One of the conditions which improve the grinding of the material is the use of water at a temperature of approximately 150 deg. This hot water is used to increase the temperature of the slurry, which increases the "filter-ability" of the slurry.

The slurry is handled from the raw mill by 4-in. Wilfley pumps and is transferred to the mixing basins, built of concrete, with F. L. Smidth & Co. agitators. The mixing and storage tanks consist of three elevated tanks 20 ft. in diameter and 18 ft. deep, three lower tanks 20 ft. in diameter and 20 ft. deep, and one quadruple tank used as a final mixing chamber. The

Cross-section through mill room



Discharge from crusher to storage



Kiln feed tank and traveling agitator

slurry is then pumped by Wilfley pumps to the kiln feed tank, which is equipped with an F. L. Smidth & Co. traveling agitator. This tank is 21 ft. deep by 25 ft. wide and 150 ft. long, with a capacity of 19,000 bbl. of slurry, or an equivalent of 5640 bbl. of clinker. All of the F. L. Smidth & Co. equipment is arranged with both mechanical and air agitation.

Both the raw and finish grinding mills are located in one building served by feed bins, which are charged by the traveling crane in the storage building. The entire grinding equipment for both raw and finish consists of three mills. The second mill is used as a standby unit and is so arranged that it can be used either for raw or finish grinding. All mills are fed by Allis-Chalmers table feeders.

The finish mill is an Allis-Chalmers, three-compartment mill equipped with return scoop for recirculating the coarse material, which is discharged over traveling screens attached to the mill. The finished cement is handled by a short screw conveyor and is elevated to a bin over two 8-in. Fuller-Kinyon pumps. This small storage bin is used as a storage tank to permit the continuous operation of the mill at times when it is necessary to blow out the Fuller-Kinyon system.

The 8-in. Fuller-Kinyon pump, driven by a 125-hp. motor, transports the finished cement to the cement silos, where it is automatically distributed to the 12 silos and six interstices by the aid of electric pneumatic valves controlled by push-button arrangement on the Fuller-Kinyon control board, near the laboratory.

A 6-in. Fuller-Kinyon pump is located directly underneath the discharge of the finish mill for recirculating to the standby mill which can be used for regrinding of "Lightning" cement. By the aid of these pumps a very flexible circulating and distribution system has been perfected.

Gypsum bins are located next to the clinker bins and gypsum is fed to the mills by an Allis-Chalmers feeder of the same design used in feeding the clinker. It has been proven that a very careful control can be maintained in feeding gypsum and clinker to the mills with table feeders.

Directly over the first and second compartment manholes is located a trav-

At the right, cast iron lifters on feed end of kiln to break up filter cake and convey it into burning zone

General view of the Arkansas Portland Cement Co. mill at Okay, Ark.

eling hoist, which can be used in dismantling the housings of the mills and in charging the mills with grinding media.

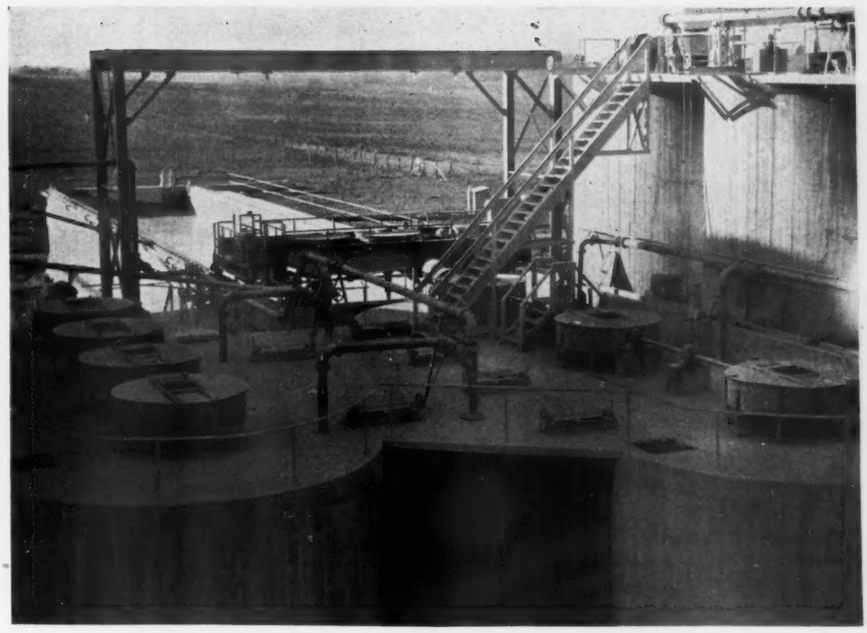
The third compartment and the motor are served by a Milwaukee 5-ton electric crane. This can also be used for handling the gear-and-pinion shaft in addition to charging the third compartment of the mill. All starting panels are located at this end of the building within easy reach of the operator.

The mill building is so designed and arranged that it is possible to install closed-circuit grinding equipment without any alterations. There is also room for two additional mills, should future expansion require them.

Kiln and Filters

At the time of the design and construction of the plant the installation of slurry filters as applied to the cement industry was still in its infancy, and it was decided not to install filters at the beginning, but to wait until future developments and experience had proven their success in the cement industry. With this idea in mind, the arrangement of the feed end of the kiln was so designed that the installation of filters would be a natural addition to the plant.

The plant was in operation practically a year before the filters were installed, so that it has been an easy matter to make practical comparisons before and after the installation of the filters. The raw material now as well as before the filter installation, is ground to 92% passing 200-mesh with a moisture content of 48 to 50%. Even with this high percentage of moisture, the slurry was of an unusually viscous nature and it was found very difficult to control and handle when the moisture content was reduced to 46%. With the high moisture it can be readily seen that a high fuel consumption was unavoidable.

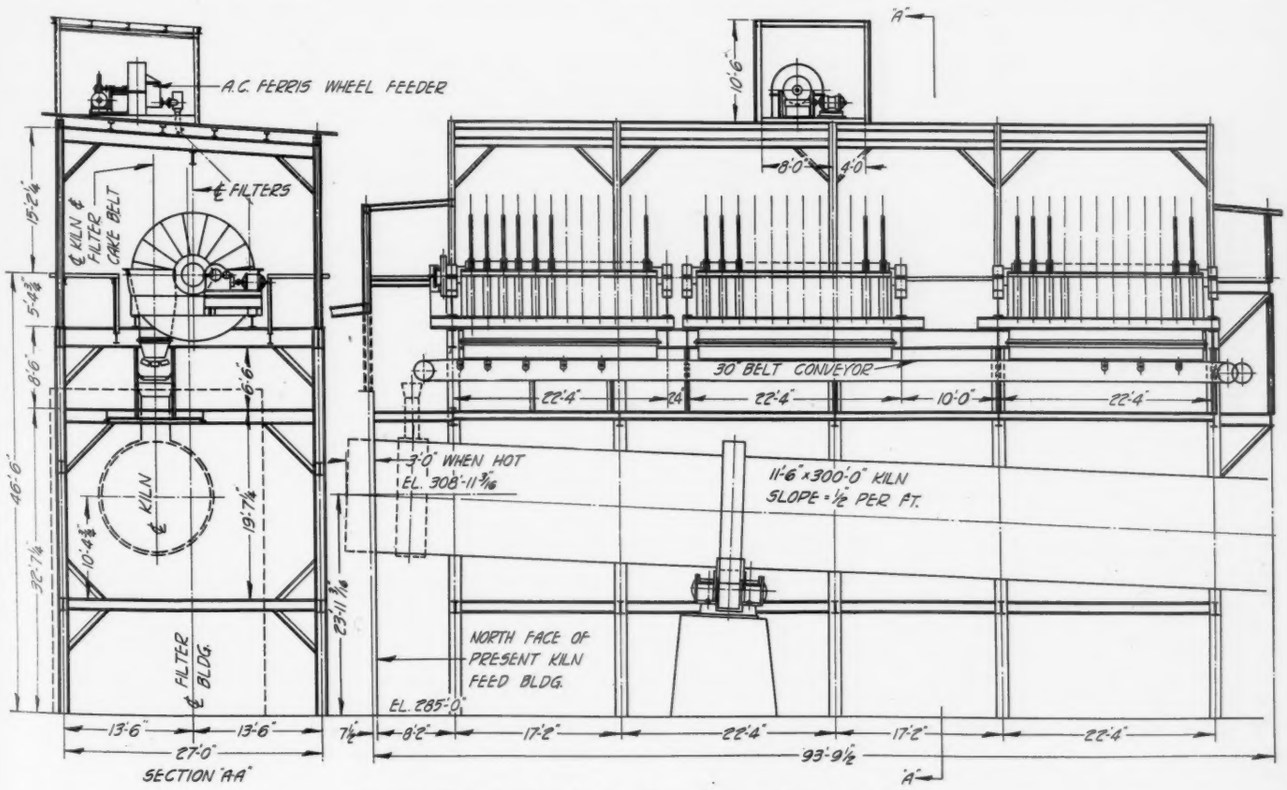


Mixing and storage tanks, with kiln feed tank in background

The Rust Engineering Co. built the concrete stack, which is 225 ft. high and lined its entire height. A steel breeching connects with the kiln flue. Openings are provided for possible connections to waste-heat boilers in the future.

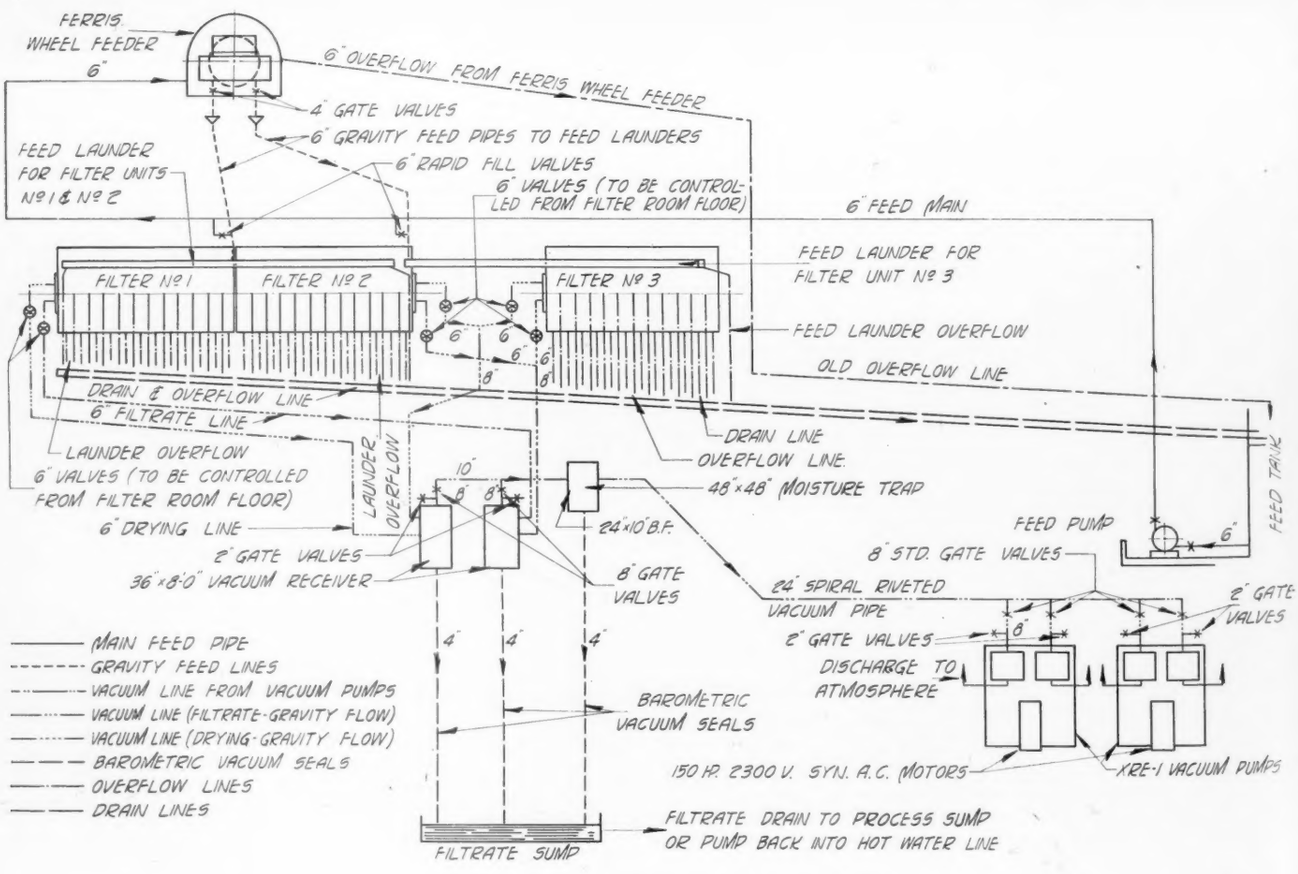
Kilns

The initial installation consisted of one Allis-Chalmers 11-ft. 6-in. by 300-ft. kiln, mounted on four sets of single-roller trunnions and driven by a 125-hp. Allis-Chalmers, variable-speed motor, with a

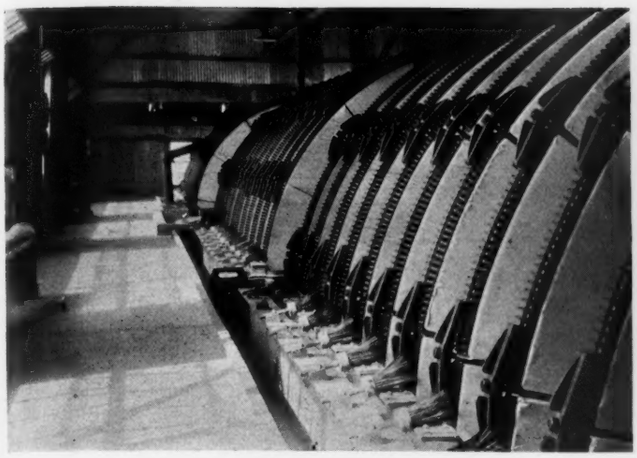


Cross-section and longitudinal section of filter installation

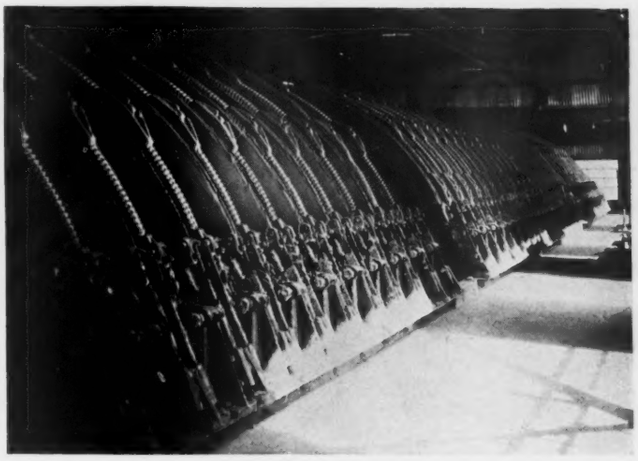
The plant in its relation to village and highway



Diagrammatic piping layout of slurry filters



Feed side of filters



Discharge side of filters

speed reduction of 50%. Slurry was pumped from the traveling agitator by a 4-in. Wilfley pump to an Allis-Chalmers ferris-wheel feeder and fed to the kiln by a 5-in. feed pipe. The kiln, operating under these conditions with a rated capacity of 2000 bbl. per day, was successfully operated with productions running as high as 2300 bbl., but on account of the extensive moisture in the slurry, and in spite of the length of the kiln, it became imperative that some method of reducing the fuel cost should be attempted.

On September 1, 1930, after careful investigation and laboratory experiments, the Oliver United disc type filters were put in operation. After a careful laboratory test made by O. A. Bayless, chemical engineer of the company, and exhaustive research by the Oliver United Filters, Inc., it was decided to install three filters of 12 discs each, with a total area of 7200 sq. ft.

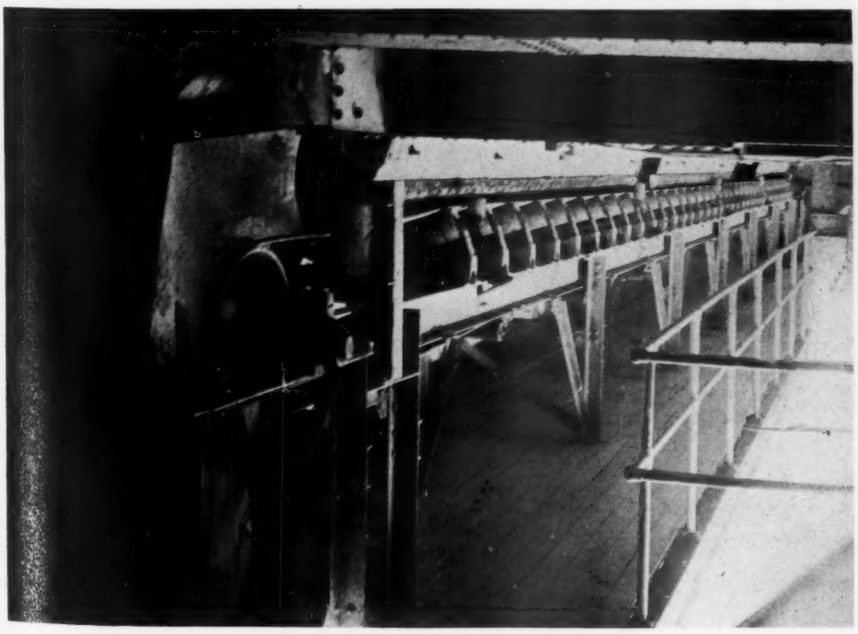
Upon the suggestion of the Oliver United Filters, Inc., the Bessemer type of feeder was decided upon as being the most practicable method of feeding the slurry cake to the kiln. This type of feeder consists of diagonal slots, 10 in. wide and 20 in. long, numbering 15, which are cut through the kiln shell. The filter cake is conveyed to a belt conveyor, collecting the material from the filters and dropping it through a housing and through the slots into the kiln.

Kiln-Feeding Details

The filter cake has a moisture content of 28½ to 29% and has an average thickness discharging from the filter disc of $\frac{7}{16}$ in. With a cake of this moisture content a great deal of anxiety was felt as to the manner in which it would be handled in the kiln, but after several inspections of the kiln it was found that the cast-iron lifters placed in a spiral for a distance of approximately 20 ft. were successfully conveying the material down the kiln with a complete absence of mud rings.

In addition to the spiral lifters there were added six rows of 10-in. high horizontal lifters for a distance of 18 ft., which has helped to break down the filter cake which balls up. This also exposes the material to the hot gases, driving out moisture and preventing the overlapping of zones, which occurred when the large balls drifted through the kiln.

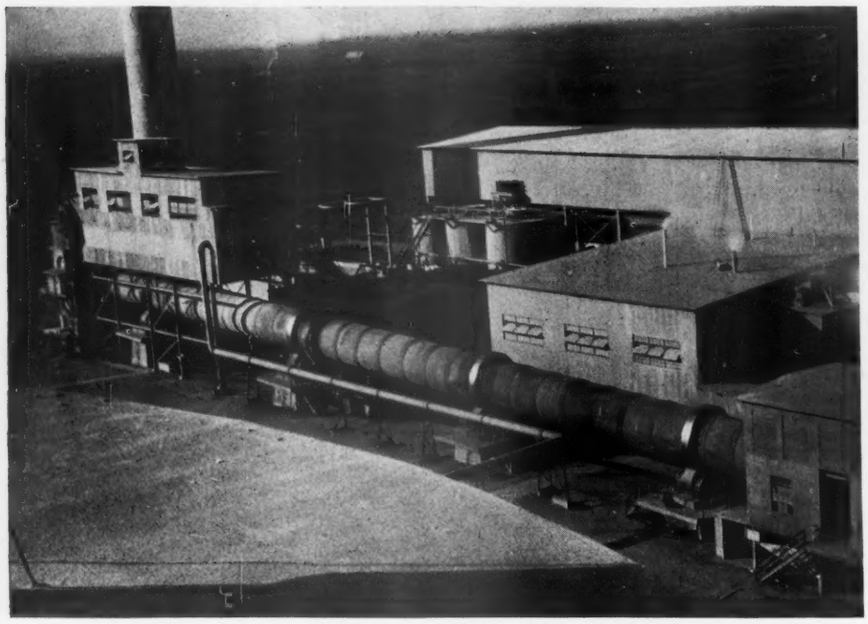
An excessive back spill was prevented by inserting deep lifters, placed on an angle of 60 deg., adjoining the feed-end retaining ring. However, it was discovered that the draft carried a certain amount of small material back to the kiln flue, which has been equipped with a screw conveyor and elevator to remove this material from the kiln flue, discharging it upon the filter cake belt, mixing in with the cake and returning it to the kiln.



Discharge end of filter cake belt

Hot Water for Slurry

As moisture and temperature, together with various characteristics of the raw material, affect the filter-ability of the slurry, it was necessary to discover which of these conditions would most likely cause the most difficulty. As the characteristics of the mix would not vary, and the moisture could be controlled, it was easily proven that the capacity of the filters is dependent solely upon the temperature of the slurry. To overcome this difficulty during the cold weather a series of coils made up of 2½-in. pipe, 600 ft. long, was installed in the base of the stack. With the installation of the coils, using the waste gases, the temperature of the feed water to the raw mill was brought to a temperature of 150 deg. F. and the temperature of slurry at the filters to a temperature of 100 deg. This materially increased the capacity of the filters and the thickness of the cake, and under these conditions a capacity of 3000 bbl. per day has been reached; but on account of the physical characteristics of the cake, which



Kiln and filter building. Note 24-in. vacuum line

vary with the temperature of the slurry, the normal production will average 2700 bbl. It is now planned to increase the lengths of coils in the stack, which will be placed in parallel to the existing coils. By cracking the valves a much higher temperature will be obtained for feeding the raw mills and with this increased slurry temperature, it is expected, an average of 3000 bbl. per day can be filtered.

The filters have been in operation for five months (when this was written) and many things have been accomplished and there are still many things yet to learn of the possibilities of the filters. One thing is sure. They have greatly increased the production of the kiln, producing a very fine, uniform clinker with a marked saving in fuel. There is no doubt that much higher efficiency will be obtained as we learn more of the filter operation.

Filter Bag Life

Practical experience with filters has proven that a great deal depends upon the efficiency of the filter bags or on the operating condition of the cloth.

Very little information is available on the possibilities of bag life, owing to the fact that a great deal depends upon not only the mix and temperature of slurry, but the analysis of the water, and on the grinding of the slurry.

Every mix and water has its own characteristics, which makes it practically impossible to anticipate filter cloth life on account of the variables entering into the slurry composition.

The bags used in starting and a replacement of our filter were made of Palma twill, 17½-oz., untreated. To date we find after five months' use that 12% of our bags are still in use and that only 10% of the bags removed were in such condition that they could be patched and used again. Our average bag change has been 6½ per day, which is under the estimate made upon starting the filters, and before any experience was at hand to guide in the probable replacement necessary to operate the filters.

Filter Control—Clinker Cooling

The feed of the filters and their speed are controlled by the kiln burner, who regulates the speed of the filters according to the speed of the kiln; and to obtain a production of 3000 bbl. a day it is necessary to have at least 800 revolutions of the kiln in 24 hours.

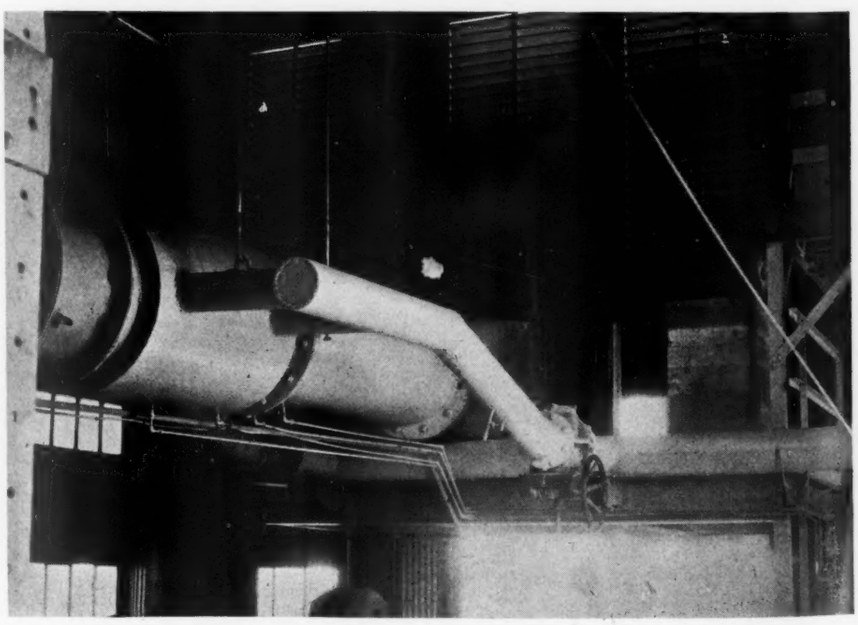
The kiln is operated without a cooler, although provisions have been made in the design of the burning platform for the addition of a cooler at some future period, should conditions warrant its installation. The clinker is discharged to one of two drags which convey the clinker directly to the clinker storage. Clinker is cooled by the aid of water sprays, which are located at a distance from the clinker chamber, whereby experience has proven quenching of the clinker can be accomplished with the minimum sacrifice of strength. (It is probably a not too well-known fact that a too rapid quenching of hot clinker reduces the strength of the cement.) The drag chain is the Link-Belt Type SD21, 14 in. wide, driven by a 15-hp. motor through a Cleveland 400AH reducer. The elevator is also a Link-Belt, using 847 chain with K2 attachments and a 14-in. malleable-iron bucket. With the double drag installation it is possible to switch from one drag to the other without shutting down the kiln.

Kiln Burner

A single 26-in. gas burner, designed by the writer, has taken care of the increase in capacity caused by the filter installation. All of the air used for combustion is furnished by a 100-in. steel-plate fan, driven by a 100-hp. motor. This fan was designed by C. A. Stilphen and built by the General Iron Works, both of Denver, Colo.

The kiln is lined the first 112 ft. with 9-in. block; the balance, with 6-in., the first 70 ft. being all high-grade, hot-zone liners.

On the burning platform, in addition to the kiln and feeder control, there is located a Leads-Northrup recording pyrom-



Gas burner, designed by the author, to take care of increased kiln capacity after filter installation

Chemical laboratory

Physical laboratory

eter, which records the temperature of stack gases. This instrument is used as a guide to the load in the kiln. An Ellington draft gage and recording meter records the air and gas pressure. With these instruments a constant check is maintained on fuel consumption.

Packing and Loading

The plant is served by a branch line of the G. N. & A. railroad and has ample track facilities to handle all present and future loading requirements. The railroad maintains daily switching service and all orders received at the plant are handled promptly through this arrangement.

The packhouse is a structure three stories in height, built of steel and reinforced concrete. There are four 3-tube Bates packers, arranged as illustrated, two discharging to each side of the building on belt conveyors with adjustable end belts, which discharge directly into the car. On the second floor is a continuous type of bag cleaner made by the Vulcan Iron Works, of Denver, Colo., with sorting tables and ample storage room for sorting sacks. All repairing and tying is carried out on this floor. A Bates automatic tying machine is used for tying the sacks. The third floor is used as a receiving and sorting room and for the storage of tied sacks, which can easily be fed to the packing floor through chutes leading directly to the individual packers. The building is equipped with an Otis elevator for handling the returned sacks from the loading dock to the top floor.

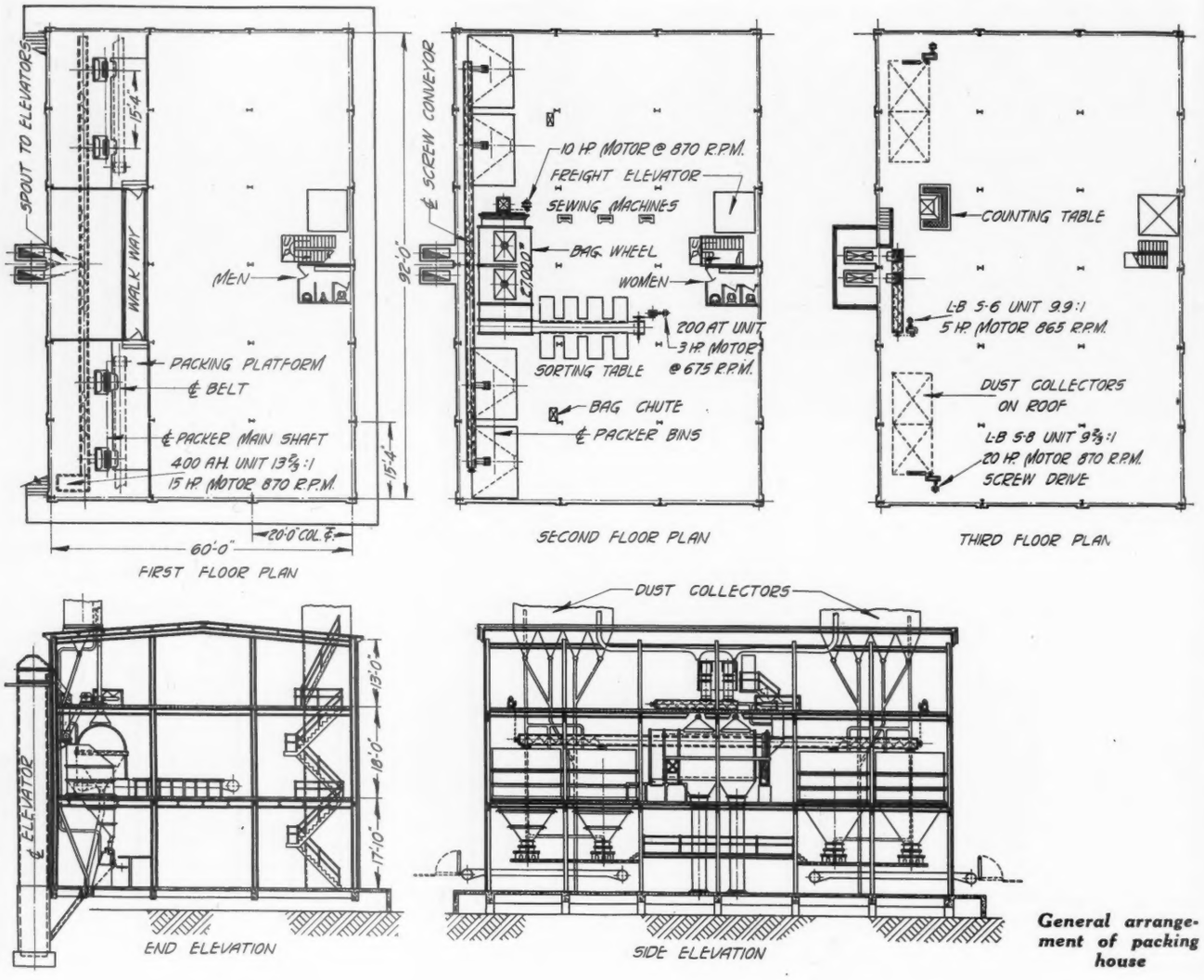
Slots in kiln for feeding filter cake

Cement is handled from the silos by screw conveyors and dual elevators, which are fed by two F. L. Smidth and Co. exbiners.

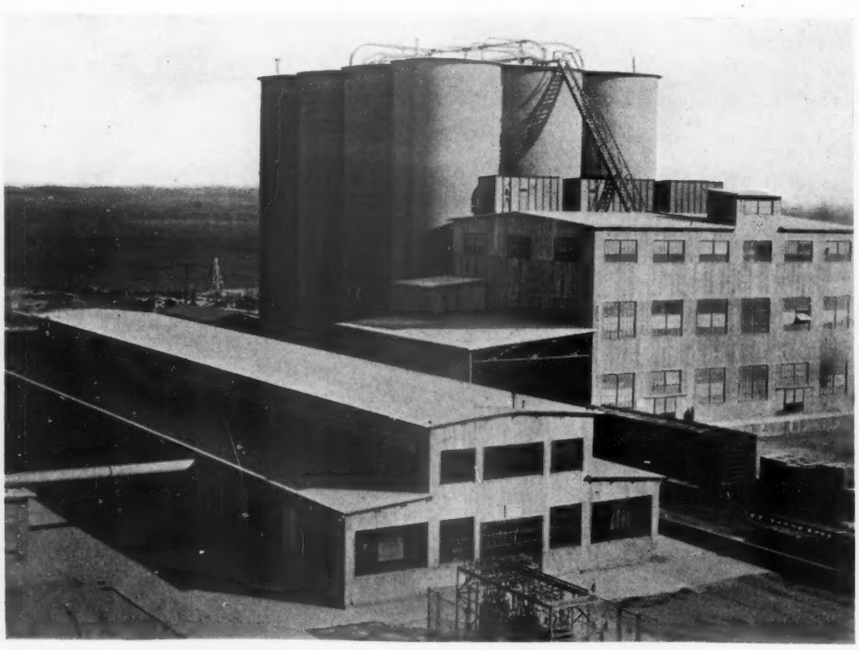
The Sly system of dust collection is used throughout the packhouse for eliminating dust, and is connected to the packers, elevators, conveyors, bag wheels and sorting tables.

The silos were designed by the engineering staff and construction forces of the company, and are illustrated in the accompanying views and drawings. There are 12 tanks 30 ft. in diameter, 90 ft. high, so arranged as to form six interstices or star bins. There are six tunnels underneath the tanks, with six lines of 18-in. screw conveyors, which are served by the exbiners. The silos are built on solid rock foundation and to date have proven their

Main street of village looking north



General arrangement of packing house



Machine shop, pack house and storage silos

design and construction to be of the highest order.

Machine Shop and Storeroom

The machine shop and storeroom, together with the switchboard and compressor room, are all under one roof. The machine shop is one of the finest equipped in the state and is most necessary on account of the isolated location of the plant. The storeroom is of ample size to house all of the stores and supplies necessary to cement plant operation. One end of the structure contains the main switchboard with the controlling panels and feeders for the entire plant. The board was designed and furnished by the Westinghouse Electric and Manufacturing Co. There are also located in this room the two Ingersoll-Rand vacuum pumps which furnish the vacuum for the filters. The vacuum line is a 24-in. spiral galvanized pipe carried overhead to the filter building, which is located at some distance from the pumps. In addition to this equipment there are two Ingersoll-Rand air compressors of the following capaci-

ties: One 1300 cu. ft. and one 2200 cu. ft. per min., direct-connected to General Electric synchronous motors. A Milwaukee 10-ton electric crane serves the entire building and can be used in the machine shop, storeroom or compressor room.

Water Supply

Water supply both for process water and drinking water is obtained from five wells, which were drilled to depths of 500 ft. and are pumped by air lifts, and then flow by gravity to separate pumps located in one building where the water is handled by Cameron pumps to two large storage tanks. Drinking water is stored in a Pittsburgh-Des Moines tank of 20,000 gal. capacity and the process water in a 100,000-gal. tank. The entire operation of the air lifts and pumps is automatic.

Industrial Village

As the plant is not adjacent to a community of any size, it was necessary to construct a village to house the entire operating force. These houses range from small four-room cottages to six-room bungalows, and are entirely modern. There is also maintained in the village a first-class commissary, where all necessities are carried in stock, making the village fairly independent of the neighboring communities. A modern clubhouse for the use of employes and officials of the company is maintained.

The village has its own grade school for children from first to sixth grades. Higher courses of study are available at Saratoga, a small town two miles from the village, where students in high school are taken care of. Modern buses convey them to and from school.

Fuel and Power

Gas is supplied by the Southwestern Gas. Co. from its fields in northern Louisiana and is distributed through the village for domestic use and to the plant for industrial purposes.

Power is also furnished by the Southwestern Gas and Electric Co., which maintains one of the largest substations in the state, and the plant is protected from power failures by two incoming lines from this source. The power company furnishes the plant with current at 2300 volts, 3-phase, 60-cycle, and to date the plant has never suffered a shutdown due to power failure.

Laboratory

A first-class physical and chemical laboratory is located in the office, with all the latest equipment for making physical and chemical tests, which govern the manufacturing of a high-grade cement.

The village was built by the company

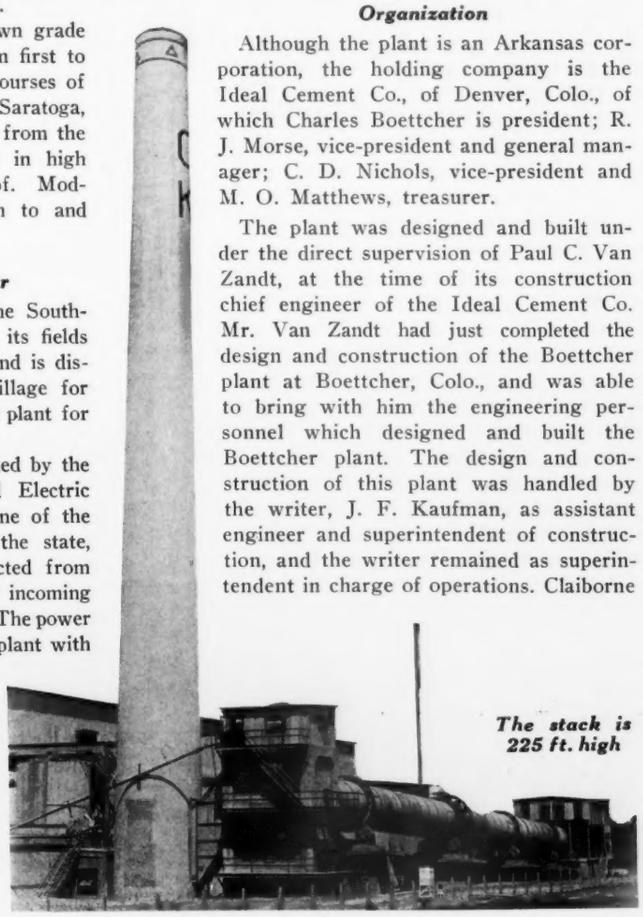
Miscellaneous

All motors throughout the plant except those listed separately were furnished by the Allis-Chalmers Manufacturing Co.; speed reducers by the Cleveland Worm and Gear Co. and the Link-Belt Co.

Organization

Although the plant is an Arkansas corporation, the holding company is the Ideal Cement Co., of Denver, Colo., of which Charles Boettcher is president; R. J. Morse, vice-president and general manager; C. D. Nichols, vice-president and M. O. Matthews, treasurer.

The plant was designed and built under the direct supervision of Paul C. Van Zandt, at the time of its construction chief engineer of the Ideal Cement Co. Mr. Van Zandt had just completed the design and construction of the Boettcher plant at Boettcher, Colo., and was able to bring with him the engineering personnel which designed and built the Boettcher plant. The design and construction of this plant was handled by the writer, J. F. Kaufman, as assistant engineer and superintendent of construction, and the writer remained as superintendent in charge of operations. Claiborne C. Van Zandt acted in the capacity of assistant superintendent of construction and made many of the mechanical designs. Leland Schuch was electrical engineer and Roy Woodmansee, mechanical engineer. The present plant personnel consists of J. F. Kaufman, superintendent; Frank K. Hensley, chief chemist; Harry C. Abrams, chief clerk and M. M. Collins, master mechanic. O. A. Bayless, of the Oklahoma Portland Cement Co., is chemical engineer for both plants. M. O. Matthews, treasurer of the company, is also manager of both plants.



The stack is 225 ft. high

Pennsylvania Marl Deposit to Be Exploited

A MARL, of high calcium content, that can be prepared for use and disposed of at a reasonable price, has been found on a tract of land belonging to John S. Brumbaugh, at Stoufferstown, Penn. Preparations are now being made to put the marl on the market. It is hoped to have the plant in operation by April 1. The supply is said to be almost inexhaustible.

Glen W. Moffatt, a quarry inspector of the Pennsylvania department of labor and industry for the past 14 years, has entered into partnership with Mr. Brumbaugh and will come to take charge of the pulverizing plant about April 1. The plant will be operated under the firm name of Brumbaugh & Moffatt. Harvey Seacrist, a well-known young man of town, is also associated with the firm and is also interested in the distribution of the product of the Brumbaugh stone quarries, recenty rebuilt on what has long been known as the Plasterer farm.

The quality of marl found on the Brumbaugh tract is said to be of an unusually high order. According to a recent analysis the calcium oxide content was placed at 51.65%. This is regarded as a high-grade marl.—*Chambersburg* (Penn.) *Repository.*

Economics of the Non-Metallic Mineral Industries*

Part II—Quality and Extent of Deposit as Factors in Its Possible Development

By Raymond B. Ladoo

IT HAS BEEN NOTED previously how important are inherent physical and chemical properties of most nonmetallic minerals. This cannot be emphasized too strongly. Examples could be cited from almost every nonmetallic mineral producing industry, but let us note but two in detail, limestone for lime making, and talc.

Things to Consider in Lime Manufacture

For the manufacture of lime both physical and chemical characteristics of the limestone are important. Lime of a sort may be made from almost any kind of limestone, pure or impure, high calcium or dolomite, but except for very low grade uses each section of the trade demands a lime of quite specific physical and chemical properties. Purity alone is by no means the sole governing factor.

The building trades use two principal types or grades of lime, finishing lime and mason's lime, differentiated by physical properties and price. They look for color, ease and quickness of slacking (or soaking for hydrated lime), plasticity, sand carrying capacity, "trowelability," and other physical properties. They are not much concerned over the chemical composition or purity so long as it "works" right and gives them a good, hard, sound, smooth wall.

No one can predict accurately by looking at a limestone or by analyzing it, just how it will behave in a kiln and what kind of lime it will make. It is a well known fact that two limestones from different deposits, which look to be identical and which appear to be the same by chemical analysis may produce limes of quite different physical properties. This may be due in part to different methods of burning but is usually due principally to differences in internal physical structure now little understood. Sometimes a careful study of burning methods shows how quality may be improved and made to approximate that of inherently better limes. But there is a very definite limit to this type of improvement, at least so far as our present knowledge goes.

Usually the chemical and industrial uses demand certain chemical as well as physical properties. About 2,000,000 tons out of the 4,000,000 tons of lime used annually in this country go into chemical or industrial plants. Some industries demand a high calcium lime, others a high magnesium lime and others want a calcium lime containing a certain definite proportion of magnesium or magnesia. Each industry sets a limit on iron oxide, alumina, sulphur trioxide, metallic oxides or other chemical constituents which may interfere with its processing or injure its product.

No matter what may be the intended use of the lime, the lime manufacturer desires certain qualities in his raw stone, so that he may produce good lime cheaply and easily. The stone should be hard and firm so that it will not break down into a preponderance of pieces too small for his shaft kilns, yet it should not be so extremely hard and tough that it is difficult and costly to drill and shoot. In burning, the stone should remain in lump form and not shatter or crumble down into a powder. The stone in the ledge should be uniform in type and quality, not an alternation of bands or beds of mixed limestone and waste, or of variable quality limestone. The good beds should be of sufficient thickness to work cheaply and on a large scale. Overburden should be light and easily removable. Caves, fissures, open seams, mud seams, etc., add to the cost of drilling and make it more difficult to make a clean product.

All of this is elemental information to the established lime producer and no attempt is made here to cover the technical aspects of lime production. The point is, though, that many people go into the lime business without knowing that there are all of these things to consider.

Some Considerations in Regard to Talc

As another example let us take a totally different type of mineral—talc. The principal talc producing states are now Vermont, New York, California, Georgia and North Carolina. Talc imported into this country comes chiefly from Ontario (Canada), Italy and France. Not only does each one of these producing districts represent a different type of talc, but in each district there are considerable variations, often quite marked. The varities in type are based in part on relative purity and on differences in the nature of the impurities and in part on the physical properties of color, hardness, shape of particle (after grinding), smoothness of "feel" or "slip" and so on.

Talcs vary in hardness from 1 to 3.5 in the Mohs' scale of hardness. For certain purposes chemical purity may be important—for example, use in ceramic products—but for most common uses the physical properties of color, slip, ability to stay in suspension in paint vehicles, retention (in paper making), and so on, are the most important. Talc from the St. Lawrence County, New York, district is so different from that produced in Vermont in hardness, color, shape of grains, etc, that the two products are practically non-competitive. They are not even used in the same industries.

Under the microscope grains of finely ground talc from different districts show

The Author

RAYMOND B. LADOO is a native of Ayer, Mass., where he was born in 1893. He is a graduate of Harvard College and of Harvard Mining School (1916). He has ever since then been actively engaged in his profession of mining engineering with various producers of both metals and nonmetals; in 1926 he joined the staff of the United States Gypsum Co. Since then he has been engaged in sales development work and other special jobs, relating more specifically to markets for crude gypsum. He is now manager of the industrial commodity department of the company.

Mr. Ladoo was a mineral technologist of the United States Bureau of Mines for several years and is the author of numerous reports and bulletins published by the government. He is also the author of a comprehensive book on the nonmetallic mineral industry. In the present series of articles he has brought together not only the results of his technical knowledge and experience but his commercial or business experience as a sales promotion expert. Certainly few men are better qualified to discuss the subject.—The Editor.

wide variations in shape and character of grain, cleavage, character of grain surface, etc. Some grains are thin, scaley and micaceous, others are elongated fibers or stubby prisms, and others are irregular or nearly equidimensional. New York fibrous talc has the ability to stay in suspension in ready-mixed paint and to assist other pigments to stay in suspension. Vermont talc has little or none of this ability. Vermont talc has a greasy "feel" and a good "slip," but New York talc has little or no slip.

To the uninitiated talc is talc, no matter where it comes from. In the government statistics of talc production totals are given for the industry, but these totals mean little unless we are able to "break down" these figures and get group totals for like materials.

Must Study Special Kinds for Special Uses

Technical investigators and research men fall into this error as well as laymen. For example, in studying the ceramic possibilities of talc, investigators may obtain small quantities of talc from a jobber or even from a producer and proceed to use it without first analyzing it and carefully studying its physical and chemical properties. They obtain certain results in their experimental work, favorable or unfavorable to talc, and then generalize and say *talc in general* has certain definite properties when used in such and such ceramic bodies. Talcs vary in quality from deposit to deposit as well as within the same deposit. Ceramists are used to the fact that clays vary tremendously, yet somehow they often assume that other mineral materials, less familiar to them, are uniform in chemical and physical properties.

In order to study the adaptability of any mineral for a specific use, it is first essential to discover if possible what factors (impurities, physical properties, etc.) about that mineral may have an influence on the product or process for which it is being tested. Then samples of this mineral should be gathered from as many localities as possible and the samples tested for these essential properties. If favorable results are obtained from one sample more samples should be examined from various parts of the same deposit or of various grades made in milling, to determine how uniform the material runs and whether or not there may be grades or types still more suitable.

Processes have been developed, patents obtained, plants built, both to produce a mineral and to use it in a specific product, based on misleading results obtained from the study of a non-representative sample. The reverse is still more common. Mineral materials have been turned down and thoroughly discredited for some uses because non-typical samples were tested, found unsuitable, and the results of the work given wide publicity. It should be noted that improper methods of testing, as well as unsuitable samples, are often responsible for black-listing a product.

Contrasts with Metal Industries

While only two examples have been given, the illustrations could be expanded almost indefinitely. Almost without exception all the nonmetallic minerals need this same type of thorough study and analysis to discover for what uses they are suitable and how they may best be prepared for those uses. The metal mining engineer has to study his deposit and to analyze or assay his ore for its metal content. He then devises a method of treatment to recover his values in concentrate form. In unusual cases the metallurgist may have to devise a special method of smelting to obtain the pure metal from the concentrates. But neither the metal mining engineer nor the metallurgist has to consider the ultimate consumer. They know that their metallic gold will be taken readily by the mint, and that their refined silver and copper and zinc and lead can readily be sold through established channels. But the nonmetallic mineral producer must work closely with his ultimate consumers. Each product is different and requires a separate study.

Few Usable Gypsums

Just one more example and we will leave this subject. Gypsum is a relatively common mineral. It is produced in nearly a score of states and hundreds of deposits exist in this country. Yet it has been possible to make suitable plaster for certain specialized uses from only a very few deposits, and these are not always of the purest material. Of two very pure gypsums, almost identical in analysis, one will make a hard, dense, strong, white pottery plaster and from the other a satisfactory pottery plaster cannot be made. Why? No one knows exactly, but apparently the answer lies in some little understood physical property of the rock itself.

Geological Knowledge Needed—Core-Drilling

It is, of course, self-evident that accurate information as to the extent of a deposit is as important in the nonmetallic mineral field as it is when dealing with the metallic minerals. The difficulty of obtaining this necessary data varies with the mineral and with the type of deposits in both fields.

Uniform, flat lying beds of sedimentary rocks, such as limestone or shale, near the surface can usually be easily, quickly and cheaply prospected. A few drill holes, a few measurements and a few analyses will usually give sufficient data on which to base a reliable estimate of available ore reserves.

At the other extreme we find deposits of minerals of very variable composition occurring in complex geologic structures, where very thorough, minute and exacting studies must be made. Much prospecting by shafts and tunnels or by core drilling must be done, and many samples must be taken and analyzed.

All of the data so obtained must be carefully studied, correlated and interpreted by men familiar with similar deposits. Even after the most thorough examination economically justified by the importance of the project, the conclusions reached must be accepted with caution. Often it is impossible definitely to block out large reserves in advance. We must be content with a reasonable assurance of sufficient tonnage to warrant the building of a plant and gamble on the future. Even the "reasonable assurance" is often something of a gamble.

Risks Involved Require Adequate Returns

It is evident that the risks involved in ventures of this latter type make necessary much greater indicated returns on capital investment than in surer ventures. If a deposit may become exhausted in five years the project must at least return 20% of the capital invested per year plus simple interest if it is to be a safe venture, and much more than that if it is to be really attractive.

In nonmetallic mineral deposits we not only have the general problem of estimating the total recoverable tonnage available—a problem always present in every mining venture—but we also often have to consider the relative amounts of the various types and qualities of a mineral—and the possible or probable life of the markets they enter. How much of each grade is present and recoverable in commercial form? Can the various grades be separated easily and cheaply? Must the separating be done by hand selection or can it be done mechanically? Hand selection usually means hand loading of rock rather than shovel loading and this means higher costs. This may not be very important in a mica mine, but it is more important in a feldspar quarry and may be a vital factor in a limestone quarry.

We cannot here enter into a detailed discussion of how these problems are solved or should be solved in each of the industries. But it is sufficient to note that they do exist and that they are exceedingly important. There are many mistakes made and failures encountered even after most cautious and careful studies have been made. Without proper study before starting an important project, ultimate success, if attained, is due to good fortune rather than to good judgment.

But trusting to luck is not today's method of industrial development.

(To be continued)

The Sand and Gravel Industry and Its Problems

Part III—Some Comments on a Variety of Subjects from the Evolution of the Industry to Details of Screens

By John Zollinger
Oakhurst, N. J.

IN A PREVIOUS ARTICLE it was stated that this particular industry is still in a crude state of experimentation. This fact is brought home more forcefully, when we visit various plants, which are the most modern, and according to report have made money. In almost every case the thought has come to me that a start of some kind was made, and as the necessity called for a chute here and a baffle there things were added, and the outcome is a chaotic assembly of units, with lack of headroom here and a squeeze or tight fit somewhere else.

The forethought and careful planning that are applied to other large enterprises seem to be lacking. A sand and gravel pit as a rule is the eyesore of a community, and does not enjoy the prestige and welcome which it really merits.

When we consider the highways, bridges, etc., which have been made a reality through this industry, some of the clean-cut finality of concrete should be applied more freely at our operations, and a great deal of the unfavorable sentiment in regard to gravel plants as neighbors would cease to exist.

Note

***THE AUTHOR** is an engineer. He has been an operator, and probably will be again.*

His comments on the industry may not be pleasant to some readers; but they are interesting, and in the main constructive.

The first article of the series was published in the October 23, 1930 issue, and the second in the December 20, 1930, issue.

There probably will be more.

If any reader has any comments, the editor will be glad to publish these too.

We don't intend to let producers in our industry become complacent.

—The Editor.

Evolution

Every industry grows and improves as a matter of evolution, providing the industry supplies the world with something useful and contributes its share towards improvements and betterments.

A few years ago it was possible in this part of the country to simply dig material and sell it for concrete work. Some of the old timers who have used such aggregates will swear that nothing again will equal this mixture for strength and durability of the resulting concrete.

Later, the bank-run material was dry screened and the sand and gravel sold separately. The gravel still contained its oversize, and the sand its loam, but this change resulted in the installation of screens and loading bins and gave birth to the familiar structures which characterize a gravel plant.

When our state engineers, chemists and experts got busy, they demanded that the sand be free of loam and soluble substances and the gravel consist of so much of this and so much of that, and all had to be clean.

These demands can be made in a short paragraph, and they sound snappy and businesslike. Some states are a little snappier than others, but altogether they are insistent upon their specifications and the inspectors will see to it that they are carried out.

This has brought the industry to its

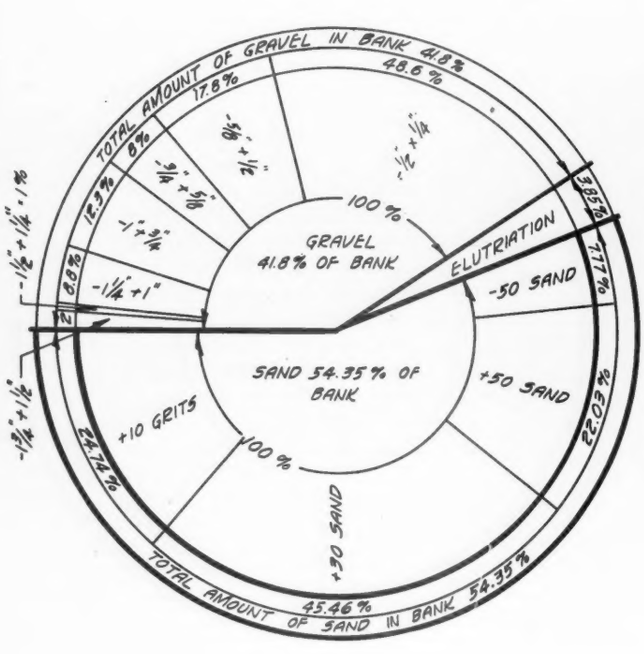
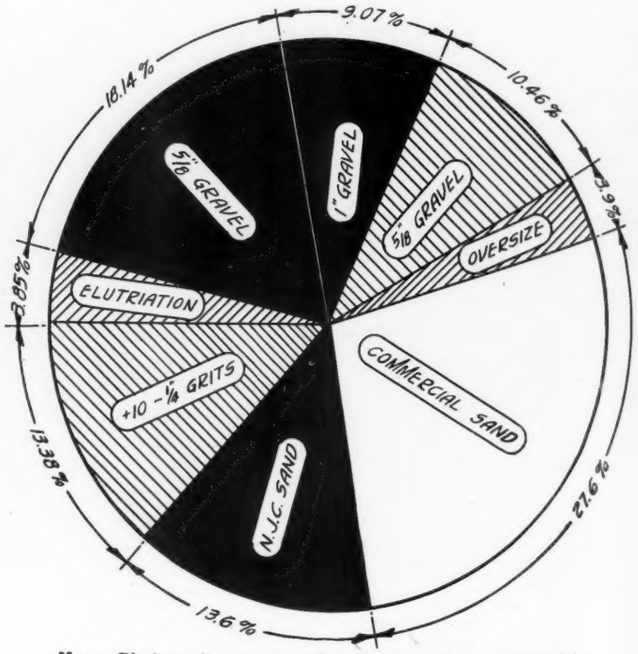


Fig. 1



Note: Black sections, state product; white sections, commercial; lined sections, waste

Fig. 2

present status and has added to the screens aforementioned more screens, larger screens, sand separators, washers, scrubbers, pumps, classifiers, crushers, grizzlies, feeders, and last but not least the batcher bins.

All this equipment is subjected to a good deal of hard work, and abrasion (sand and grit will do their underhand work), and although a plant will give us ever so much food for thought, it is no poet's paradise.

When we finally have contrived to make the gravel consisting of so much of this and so much of that and load it on cars or barges the ornery stuff will segregate. By this time you are ready to look for your last year's fishing tackle and kick at every gravelstone obstructing your view. But there is something about this business which seems to hold us, in spite of all the stones that are put in our way; and one man in particular who had more than his share of hard knocks in this line has secured for himself another hundred acres and is ready to go at it again, should his present operation give out.

Profits and Sales

No doubt the ideas of profits in the sand and gravel business are erroneously thought to be tremendous. This has resulted in corporations with heavy overhead burdens. Not enough executive material with constructive ideas and actual experience is available to run plants carrying such overheads, and keep going. It is a profitable business, and will become more so, but until the actual production end is carried on by brain work, rather than by brute strength and ignorance, the profits will correspond to the happy construction of a deposit, rather than positive planning. The sales department will have to co-operate more closely with the production end, and dispose of the material which now constitutes waste and in some instances attains a proportion of one-third of the raw material.

To substantiate this assertion the following illustration will clearly prove the case:

Fig. 1—Shows the construction of a certain deposit relative to state specifications. Gravel deposit = 41.8% of total bank and sand = 54.35%. A small percentage is lost in elutriation or the process of washing.

In looking over the Fig. 1 chart, we find that practically 50% of the gravel consists of minus ½-in. plus ¼-in. material. Should this plant produce state material the ⅝-in. specification would come nearest to the condition, since from 30 to 60% of this material would be permissible. However, in order to balance the amount, a certain percentage of 1-in. gravel has to be mixed with ⅝-in. gravel in order to bring up the percentage of large stones.

Fig. 2—Shows the amount of waste, if producing 1 part of 1-in. to 2 parts of ⅝-in. state gravel. It is understood that 27.6% of saleable material is disposed of and still this arrangement would leave 31.59% of material of no sales value.

Fig. 3—Shows a relation of equal parts 1-in. and ⅝-in. material leaving a waste product of 40.89%.

Fig. 4—Shows the plant producing material for commercial use only and we find the waste product cut down to 17.7%, consisting of material that could be disposed of easier than the larger aggregate, when producing state material.

These charts were constructed to prove, that this particular deposit was not entirely suited for state work, and at the time the relation of 1-in. gravel to ⅝-in. gravel had not as yet been established. The fact remains, that in any case a considerable amount of waste material had to be handled, and as in this case, certainly proves a drain on profits.

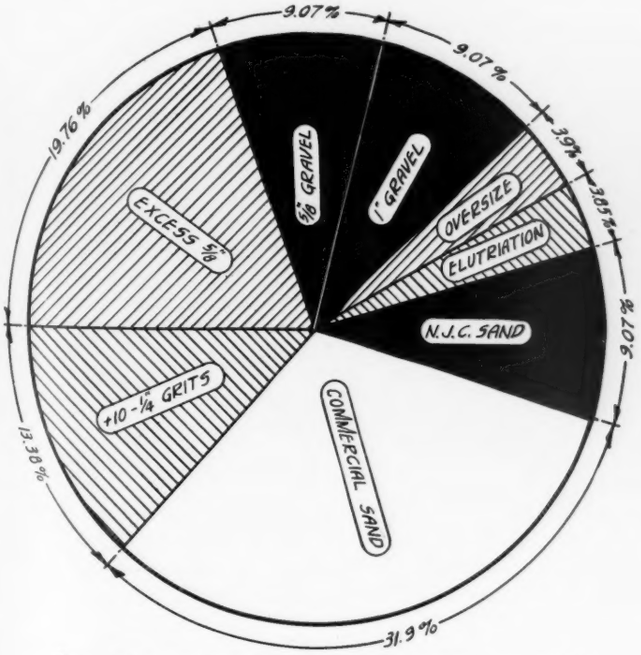
Screening

It is necessary to know the class of material a plant is going to produce in order to decide on the proper screening equipment. If the raw material consists of a large amount of boulders, preliminary crushers will have to be installed. The tonnage per hour has to be considered in order to select the proper wire cloth or perforated plate.

Should clay lumps constitute part of the raw material, the preliminary screening should be done dry. In this way the clay will not coat the gravel and is easier to handle. If the oversize is to be crushed, the clay will, of course, have to be separated again before the product goes to the crusher. This separation can easily be made, providing the necessary headroom can be provided, and the writer will be glad to explain the wrinkle to any operator having trouble with this item.

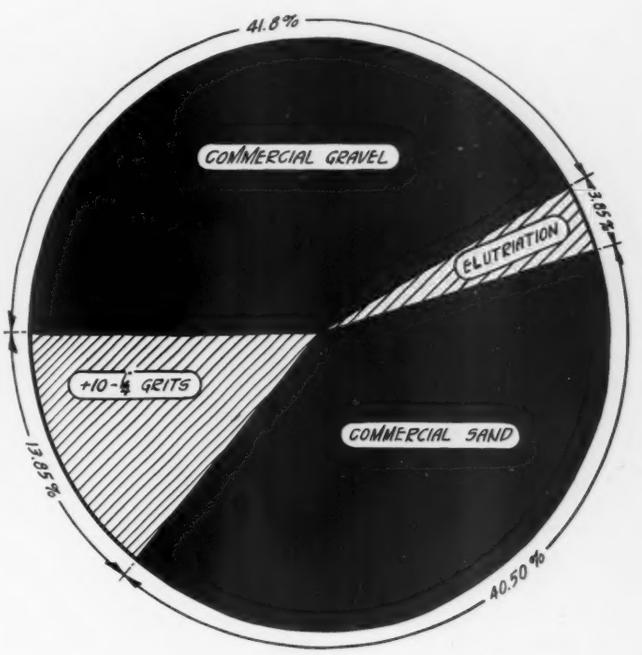
There are any number of revolving screens on the market, that will do the work desired; however, the writer is of the opinion that woven wire will give much better results than perforated plate; the percentage of open area is greater and the screen need not be so cumbersome and heavy, since the load is discharged rapidly. The blinding will not be nearly so severe and if the proper screen cloth is used, the replacements are well in proportion to the better results obtained.

A screen was built at one of the plants in this vicinity, which has given excellent



Note: Black sections, state product; white sections, commercial; lined sections, waste

Fig. 3



Note: Black sections, saleable material; lined sections, waste

Fig. 4

results. The ease with which the screen cloth can be changed has caused additional installations at other plants with the same satisfactory results. A sketch showing the type of clamp used to hold the cloth, might be of interest and since this clamp has proven very successful anyone contemplating a change to screen cloth will do well to imitate this method.

The skeleton construction is essentially of structural material, T-iron being used for longitudinal members, held in place either by spider legs, or if the trunnion type screen is used, the ends are constructed to accommodate the T-irons. The screen cloth is put on from the outside, making it very easy to install. Sand jackets are now in operation, held in the same manner, with the addition of small angle irons bent to the radius of the screen and bolted at the butt ends.

The writer visited a plant some little time ago, where two large revolving screens were in operation. At each screen two men were busy with clubs, pounding the screens to relieve the blinded areas. Such procedures seem antiquated and unnecessary, since this particular phase of troubles has been solved.

If a revolving screen is used for this fine separation and a heavy load is carried, then the open area of the screen cloth is of prime importance. The increased open area will, of course, decrease the size wire, and for this reason it is highly important that quick changes be effected, since replacements are heavy. However, it is cheaper to change screen cloth than to operate with inefficient surface, which will not give the desired separation and will produce faulty material.

A number of flat screens are on the market embodying almost every motion imaginable; some are better than others and all only good in their proper places. It may be but an idea, but it seems to me if a vibrating motion were combined with a revolving action, very efficient screening could be accomplished, since it would combine the good qualities of a revolving screen with the good qualities of a vibrating screen. Incidentally the sizes of revolving screens could be cut down in length and blinding would be reduced to a minimum.

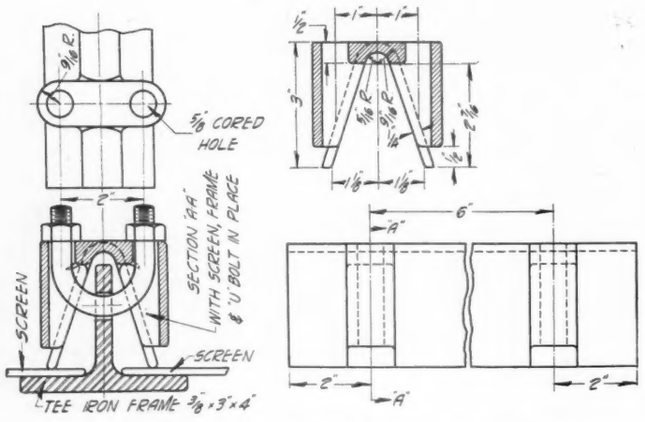


Fig. 5. Clamp for easy replacement of screen cloth

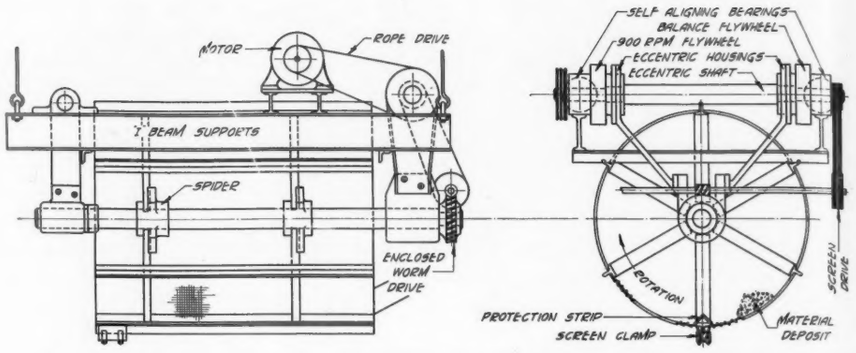


Fig. 6. The author suggests a combination of vibrating and revolving screen

NEW JERSEY STATE SPECIFICATIONS FOR GRAVEL AND SAND

(State Highway Commission)

Screens	1½-in. Gravel Cum.	1½-in. Gravel Bet.	¾-in. Gravel Cum.	¾-in. Gravel Bet.	1-in. Gravel Cum.	1-in. Gravel Bet.	⅝-in. Gravel Cum.	⅝-in. Gravel Bet.	Sand Cum.	Sand Bet.
—2 in.+1¾ in.	100	10– 0	.....	.....	.....	.....	.....	.....	.....	.....
—1¾ in.+1½ in.	90–100	90–70	.....	.....	.....	.....	.....	.....	.....	.....
—1½ in.+1¼ in.	.....	90–70	100	10– 0	100	15–0	.....	.....	.....	.....
—1¼ in.+ ¾ in.	0–30	0–30	90–100	45–25	85–100	85–75	100	10	.....	.....
— ¾ in.+ ½ in.	.....	.....	45–75	30–30	0–25	0–20	90–100	60–40	.....	.....
— ½ in.+ ¼ in.	.....	.....	15–45	15–40	0–5	0–3	30–60	30–54	.....	.....
— ¼ in.+10-mesh	.....	.....	0–5	0–5	0–2	0–2	0–6	0–6	100	0–20
—10+30-mesh	.....	.....	.....	.....	.....	.....	.....	.....	90	30–60
—30+50-mesh	.....	.....	.....	.....	.....	.....	.....	.....	45	20–40
—50-mesh	.....	.....	.....	.....	.....	.....	.....	.....	15	10–25

An incident of actual experience might serve to illustrate the theoretical value of such a screen. At one plant considerable trouble was experienced with blinding of screens, and comparing the operation with another handling similar material with similar equipment without trouble, the answer was not at once found. However, the screen which had not given any trouble was overhauled, the trunnions being out of round, etc., upon starting again blinded severely. The reason was finally found to be the vibrating motion imparted to the screen by the uneven shape of the rollers; and this particular operation is at present running and the screen does not blind, meaning, of course, that the rollers again are out of round.

Some screen manufacturers should devote some experimental work to a screen of this type and, I am sure, it will result in a new way of screening more economical and efficient than any now employed.

To handle large quantities of material and make close separations requires large screening area. As a rule not enough is provided and the result is overloading and incorrect separation. Whatever type of flat screen is selected, some allowance should be made for extra loads. It is necessary at times to slow up production, owing to content of raw material, etc., and the plant should be able to take care of an overload, to make good such losses.

Washing

A common practice, to install sprays for washing gravel, is to place pipes square across the screen at intervals over the entire length, with holes drilled for outlets. Such sprays do not give very good results; they clog easily and do not cover the entire surface. A better way is a 1¼-in. pipe drilled and tapped for ½-in. pipe nipples, say 3 in. apart, ½-in. by 3-in. nipples plugged at the end with a saw slot cut a ways through the diameter, ½ in. back from the plugged end. These will give a very satisfactory spray, which will cover the entire surface, providing sufficient pressure is applied. Lately I noticed a nozzle being advertised for this purpose, which no doubt will help to produce cleaner material.

Very often we like to do things without buying new machinery. We try to get by with what we have, whereas it would be cheaper to scrap the old and invest in the more up-to-date and more efficient equipment. There is no standing still in this business, either we advance and improve or we are left behind and find ourselves wondering why we cannot make money.

(To be continued)

New Slag Plant for Eastern Ohio

THE Standard Slag Co., of Youngstown, Ohio, recently began construction here of a new plant at Holliday Cove, Ohio, near the Pennsylvania railroad property.

When completed, the plant will employ between 20 and 25 men.—*Steubenville* (Ohio) *Herald-Star.*

Gypsum Industry in 1930

THE GENERAL FALLING OFF in the building construction industry throughout the United States in 1930 was reflected in the total output of crude gypsum mined, production decreasing approximately 33% as compared with 1929, the United States Bureau of Mines, Department of Commerce, points out. While the price trend during the past four years has been downward, there was a decided upward movement during the year in some sections of the country, notably in the East and on the Pacific Coast. The average rise was approximately 15% over 1929 prices, although many individual producers reported prices the same as in 1929. Rises of from 30 to 70% were locally reported on fibered hardwall plaster. Prices are generally expected to remain at their present level during 1931. The industry is hopeful that 1931 will see the beginning of a new cycle of building, public works accounting for the larger part during the first half of the year, probably followed by a sharp upturn in all construction by the middle of the year.

There were very few major developments in the gypsum industry during the year. With regard to primary producers, no new plants were built or contemplated. The United States Gypsum Co. closed and dismantled its plant at Arden, Nev.; henceforth it will supply the southern and central California market from its plant at Midland, Calif. One western producer of finished gypsum products, the Gypsum Products Corp., a subsidiary of the Schumacher Wall Board Co., of Los Angeles, completed a new wall-board plant at Seattle; this company, however, does not calcine its plaster but purchases its requirements from producers.

The Canadian gypsum industry suffered less from the general business slump than did that in the United States, production of crude gypsum decreasing approximately 12% as compared with 1929. A sustaining factor was the export activity of the Gypsum, Lime and Alabastine, Canada, Ltd., whose products are shipped in large quantities to Europe, South America, and Australia. During the year the Western Gypsum Products, Ltd., completed a two-kettle calcining plant near Winnipeg, Man., and also a wallboard plant capable of producing 80,000 sq. ft. of board a day. This company secures its crude gypsum from Amaranth, Man., on the southwestern end of Lake Manitoba, where its proved reserves are reported already to amount to 9,000,000 tons.

The attached table shows the production, imports and sales of crude gypsum and gypsum products for the four quarters of the year 1930. The number of operators reporting for the last two quarters of the year was 31, representing over 99% of the total output of crude gypsum in the United States.

United States Gypsum Co. Denies Report of Expansion

PERSISTENT REPORTS that the United States Gypsum Co. will start immediate construction on an extensive addition to its present East Chicago, Ind., plant were declared unfounded by R. G. Bear, treasurer, at his Chicago office.

The reports, which have filtered through from various semi-official sources, state that plans for the proposed new unit already have been drawn and that construction will be started this summer in anticipation of the World's Fair demand for gypsum products.

Mr. Bear denied the truth of the statement in its entirety. He said that in view of present conditions, the company would be very foolish to construct any new additions now, especially so inasmuch as productive operations in the East Chicago plant at present are being maintained at a low rate.

"We have sufficient capacity in East Chicago to take care of all future requirements for several months to come," Mr. Bear declared.

He also stated that the company did not anticipate any materially increased demand for its products until perhaps the latter part of this year when building operations are expected to reach a normal figure.

According to the reports, the gypsum company proposes to speed up production to day and night capacity within the next two or three months; but Mr. Bear refused to discuss that angle.—*Hammond* (Ind.) *Times.*

Spokane, Wash., Has New Gypsum Industry

THE Spokane Ornamental Plaster Works has opened a factory at S18 Haven, Spokane, Wash., and its first large job, making patterns for the ornamental concrete on the new Fox theater, is nearing completion.

"With the building development in progress in the Inland Empire and further development anticipated for the near future, we saw an opportunity to make Spokane the headquarters of a new industry," said V. J. Schneider, who with O. J. Olsen, owns the new factory. "The growing use of monolithic concrete opens a field for this special line of manufacturing.

"The plaster patterns are put in place inside the concrete forms and concrete poured into the patterns," said Mr. Schneider, explaining the process. "On removal, the ornamental part of the wall is an integral part of the concrete structure."

Ornamental work for an auditorium at Medical Lake also is being made in the company's shop. Other jobs on which the company is preparing to work include patterns for the Spokane and Eastern Trust Co. building, and several buildings in Montana.

"There is no similar plant between Seattle and Minneapolis," Mr. Olson said. "We believe there is a real opening here for our factory as the elimination of crating, reduction of shipping cost and other items give a local plant an opportunity to bid favorably."

Mr. Olson has lived in Spokane some time and Mr. Schneider recently moved here from Seattle.—*Spokane* (Wash.) *Chronicle.*

QUARTERLY PRODUCTION, IMPORTS AND SALES OF GYPSUM PRODUCTS IN THE UNITED STATES IN 1930, AS REPORTED BY OPERATORS

		First quarter	Second quarter	Third quarter	Fourth quarter	Totals
Number of operators reporting		28	28	31	31	
Crude gypsum mined	short tons	755,069	1,021,607	929,891	661,865	3,368,432
Crude gypsum imported (as reported by importers)	short tons	*	253,960	339,934	204,013	797,907
Crude gypsum sold (domestic and imported)	short tons	169,748	286,847	300,468	197,843	954,906
Calcined gypsum produced from domestic and imported rock	short tons	615,606	735,428	662,089	553,729	2,566,852
Calcined gypsum products sold from domestic and imported rock:						
For pottery, terra cotta, plate glass, mixing plants, etc.	short tons	56,943	52,532	46,345	45,614	2,014,434
Keene's cement	short tons	10,409	10,446	11,102	6,979	38,936
Neat, wood fiber, sanded gaging, finish plasters, etc.	short tons	401,624	503,933	475,012	384,993	1,765,562
Wall board	square feet	117,602,228	145,460,288	96,168,129	87,121,624	446,352,269
Plaster board	square feet	61,906,689	74,251,280	69,252,296	54,765,352	260,175,617
Partition tile	square feet	9,367,877	10,467,258	7,031,100	6,231,541	33,097,776
Roof tile	square feet	686,142	1,074,242	*	896,672	2,657,056
Other tile	square feet	*	*	*	*	
Other calcined gypsum sold	short tons	3,664	3,415	4,424	4,070	15,573

*Less than three operators reporting.

Effect of Size and Grading of Aggregate on Strength of Concrete

Reviewing a Paper by Stanton Walker Before the National Sand and Gravel Association

By Edmund Shaw
Contributing Editor, Rock Products

AT the recent convention of the National Sand and Gravel Association, Stanton Walker, director of engineering and research, gave a paper on "Review of Tests on Effect of Size and Grading of Fine and Coarse Aggregates on the Strength of Concrete." The paper illustrates the kind of work which is especially needed at the present time, the collection and arrangement of data from the many published tests dealing with aggregates.

The purpose of such investigation is not the setting up of a theory, but *economy*, and the economy extends beyond the immediate job and the immediate time. To quote the paper, "Waste is uneconomical, not only on account of the increased cost of production but because of the not generally understood fact that supplies of suitable aggregate are being rapidly exhausted." Some day we may find ourselves with only the sand and pea gravel that producers have discarded, and may wish we had used our resources more intelligently.

The discussion of results is confined to strength tests because, the paper says, "strength is our most common measure of quality; and so far as the effect of size and grading is concerned, it probably is an accurate measure of other desirable properties." The theory of concrete design taken as a basis for what follows is, naturally, the water-ratio theory, since the author of the paper did much of the work that led to this theory. And the paper says of it that "it is the most complete theory of proportioning and probably the most accurate that has been advanced."

However, it is acknowledged that there are factors which may change and vary the results obtained for the same water-cement ratios and gradings. To quote the paper: "Tests show that changes in size and grading of aggregate affect the strength of the concrete in proportion to the amount that the water ratio required to produce the same consistency is affected, where the differences in grading involved are relatively large. However, when comparatively small differences are in question, other factors, not definitely identified, overshadow the general relationships."

The paper says that theories of proportioning "have been so interpreted as to over-emphasize the economy of large sized aggregates." In many parts of the country the gravel industry is handicapped by having little or no material coarser than 1½-in. in diameter. Hence the high value to the industry of the tests which follow. It is rather curious that while the gravel industry is trying to find markets for finer products the crushed stone industry, or at least a part of it, would like to sell coarser products, and there are many plants in the United States which crush everything to 1½ in. and finer.

Editor's Note

MR. WALKER'S PAPER was itself a review, covering much of the data developed during recent years on this subject. Mr. Shaw has here taken the salient points of the paper and put them in shape for consideration by the material producer, with some comments from his own extensive study and experience. Mr. Walker, while not committing himself to definite conclusions, sees three deductions clearly indicated by the work done so far. These are given in the closing paragraphs of this article.

The Limiting Factors

The problem of size and gradation divides itself into the questions of relative economy of different sizes of aggregates and the variations of gradings that may be permitted without causing important variations in strength. For:

"If the strength of concrete is quite sensitive to relatively small variations in size and grading of coarse aggregate, then rigid specifications for grading should be drawn and a premium should be placed on special gradings. If relatively wide variations in size and grading may occur without important changes in the strength of the concrete, then economy demands specifications which provide for the greatest utilization of available supplies."

The tests reviewed begin with the Association's own tests. Most of these should be familiar to Rock Products readers, as they have been published either completely or in abstract form in this paper. The first mentioned (which was summarized in the Jan. 4, 1930, issue) studies the effect of varying the maximum size of coarse aggregates. As with the other tests, arbitrary mixes and trial mixes were run, the latter being proportioned with constant cement factor and mortar-voids ratio. It is to these of course that we should look for the most consistent results. From the summary given in the paper the following figures are taken:

TRIAL MIXES

Maximum size	⅜-in.	¾-in.	1½-in.	2-in.
Fineness modulus				
Gravel	5.90	6.35	7.07	7.55
Mixed aggregates	4.52	5.19	5.58	6.22
Compressive strength, lb.	2220	2590	2725	3045
Modulus of rupture, lb.	430	500	515	540
Water-cement ratio	1.01	0.93	0.85	0.83

The paper says for the average of the proportions studied concrete made with a ¾-in. maximum size of gravel was about 11% higher in compression and 8% higher in [illegible]erse strength than with the ⅜-in. [illegible]um size. The [illegible] relationship between stre[illegible]ter-cement ratio is also noted.

The laboratory also made a comparative test on two sizes of gravel from St. Louis, Mo. The coarser had a fineness modulus of 7.38 with a maximum size of 1½ in. and the finer a fineness modulus of 6.66 with a maximum size of ¾ in. Two mixes were used. The results are shown in the following:

	Water/ cement	Comp. strength	Mod. of rupture
6-sack mix—1½-in. max...	0.82	3860	625
6-sack mix— ¾-in. max...	0.82	3900	685
4-sack mix—1½-in. max...	1.15	2160	330
4-sack mix— ¾-in. max...	1.35	1620	265

All mixes were made to have a mortar-voids ratio of 1.75 and the consistency produced a flow from 172 to 179. Similar comparisons were made on two gravels from Boston which gave results as follows; they are interesting as they show two different mortar-voids ratios:

Maximum size	¾-in.	1½-in.
Water-cement ratio		
For M/V, 1.75	0.77	0.74
For M/V, 2.00	0.79	0.76
Fineness modulus of gravel	6.82	7.40
Compressive strength at 28 days		
For M/V, 1.75	4040	3820
For M/V, 2.00	4050	4180
Modulus of rupture at 28 days		
For M/V, 1.75	685	680
For M/V, 2.00	660	696

The uniformity in strengths, transverse

and compression, is somewhat astonishing. Another pair of gravels, from the vicinity of Washington, tested in the same way, showed almost equal uniformity in strength, although the results were slightly lower. A test made on three gravels from Florida differed from the others in that both the water cement ratio and the cement content were kept constant.

Fineness modulus of gravel	6.75	7.30	7.87
Flow	145	155	161
Water-cement ratio	0.75	0.75	0.75
Compr'sive strength	3740	3590	3420

In this test the result showed about 9% higher strength with a smaller size of material and a slightly higher strength of the medium size, but the paper notes that there is a corresponding decrease in consistency as shown by the flow.

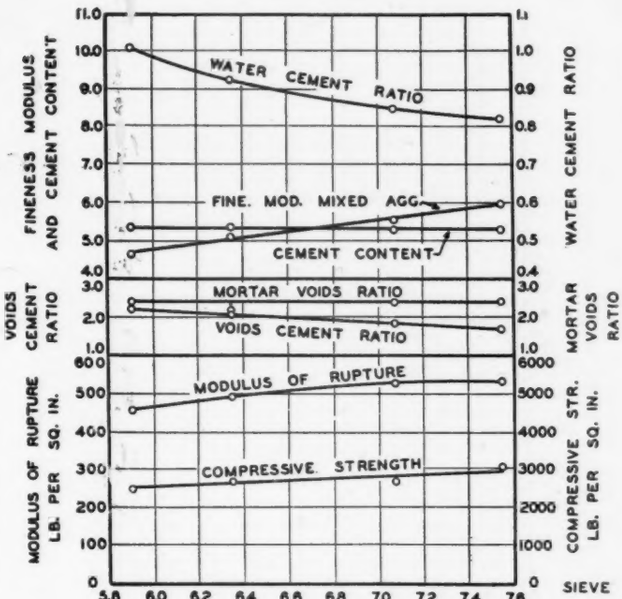
Variations in the maximum size in coarse aggregates represent one type of variations in grading. A second type is that in which the percentages of the intermediate sizes of gravel are varied. The laboratory carried out a study of such variations, which were as wide as would be permitted by A. S. T. M. specifications. There were three different gradings of sand and three of gravel. These tests were also summarized in Mr. Walker's articles in the January 4, 1930, issue. But for the sake of comparison a summary of the results is given here, taking only the trial mixes into account.

Fineness [illegible] of gravel	6.65	[illegible]	50
Fineness [illegible] ed aggregates	5.52	5.69	5.96
Average ceme[illegible]	5.37	5.36	5.41
Average voids-cem[illegible] ratio	1.86	1.83	1.73
Average water-cement ratio	0.87	0.84	0.82
Average mortar-voids ratio	2.13	2.29	2.23
Average compressive strengths	2950	2750	2895
Average modulus of rupture	540	535	545

In the arbitrary mixtures of the test (from which no results are given here) there was a decrease in strength as the gravel was made small. This was more noticeable in 1:2:4 mixes. For the trial mixes the strengths as shown above are sufficiently uniform to prove that the range in gradation permitted by A. S. T. M. specifications does not seriously affect the strength of concrete. This same thing was shown by the test on the effect of addition of finer sizes of gravel (also given in Rock Products, January 4, 1930. and published as Circular No. 7 of the Association).

Tests from other research laboratories begin with two examples from the publications of the Portland Cement Association. The first is from Bulletin No. 16, which shows the rise in strength with the increase in fineness modulus, as below:

Maximum size of aggregates	No. 4	⅜-in.	¾-in.	1½-in.	3-in.
Fineness modulus of mixed aggregate	3.00	4.00	5.00	5.50	6.00
Water-cement ratio	1.36	1.15	0.99	0.93	0.93
Compressive strength, lb. per sq. in.	1220	1910	2630	2790	2630



TOTAL PERCENTAGE PASSING				SIEVE SIZE SQUARE OPENING
100	100	100	100	2"
100	100	100	75	1 1/2"
100	100	58	45	3/4"
100	60	30	20	3/8"
10	5	5	5	NO. 4
0	0	0	0	NO. 8

Effect of maximum size of gravel on strength of concrete

The notable thing in this series of tests is that the ¾-in., 1½-in. and 3-in. maximum sizes give practically the same strength. If the reader will remember the fineness modulus strength curve he will recall that the portion from F. M. 5.00 to F. M. 6.00 is rather flat. In other words, a gradation does not particularly affect strength if the fineness modulus is between 5.00 and 6.50 or 7.00. This is perhaps as good a reason as any for saying that the maximum size and gradation may vary within rather wide limits, with the ordinary commercial sizes of coarse aggregate, without particularly affecting the strength. The paper does not bring this out but it seems to the reviewer that it should be added.

Confirmed by Other Tests

Another test from the Portland Cement Association shows strengths with maximum size of 1 in., 1½ in. and 2 in., two gradations for each of these. The cement content averaged 6.1 sacks in all cases. The strengths for the different fineness moduli were:

Fineness modulus, gravel	6.64	7.00	7.00	7.50	7.00	7.50
Modulus of rupture	545	505	540	530	570	555
Compression	3870	3560	3660	3620	4180	3970

These tests were made with varying quantities of sand, the mix with the highest strength being chosen. From this it might be judged that the test got all the strength that was possible from each coarse aggregate and the particular sand used. As in some of the preceding examples, the uniformity is marked. Since these were made with the best amount of sand and the same cement factor, they correspond to the trial mixes of the association laboratory given above and confirm the results obtained by them.

The New Jersey Bureau of Public Roads tests are examined in considerable detail. The results of this "ambitious investigation of the effect of grading of coarse aggregate," as the paper calls it, are summarized in two tables which are so detailed that they cannot be abstracted very easily.

In this test there were two kinds of grading and the paper says:

"Results of the averages for all of the so-called 'well graded' aggregates (those fairly uniformly graded from fine to coarse) are compared with the averages of the results for the coarse aggregates from which the finer sizes were omitted (the 'poorly graded' ones) for the 1:1¾:3½ mix. Practically identical strengths were obtained, but, on account of the higher voids in the coarse aggregate, more cement was required for the 'poorly graded' materials than for the 'well graded' ones. In another group of tests, the same water ratio was used and the proportion of aggregate to cement varied to maintain the same consistency. Practically the same strengths were obtained and the same quantity of cement used with the different types of gradings. This result is somewhat inconsistent with the other results since the data in that table would lead to the expectation of a higher cement content for the 'poor gradings.' For the range in grading shown, no consistent relationship between the grading of the coarse aggregate and the strength either in compression or flexure is indicated."

One table which bears directly on the matter of the relationship of maxmium size to strength, seems worth quoting.

AVERAGE WITH 33, 38 AND 40% SAND

Coarse aggregate	Grading No.	Cement content	Mod. of rup., lb.	Compres. lb.
1 to 3 in.	2	6.0	572	3430
1 to 2½ in.	5	5.9	515	3265
¾ to 2 in.	8	6.0	505	3070
½ to 1½ in.	12	6.2	515	2955
½ to 1 in.	13	6.4	530	3300
Average	....	6.1	530	3205

The tests of G. S. Hutchison given in his paper delivered before the 1925 A. C. I. convention are interesting because variations in maximum size were tested with

20%, 25% and 30% cement. The gradations were ⅜ to ¾ in., ⅜ to 1½. and ⅜ to 2¼ in. The paper says of the results:

"It will be noted that the differences in strength between the 1½ and 2¼ in. maximum sizes are negligible. While the differences between the ¾ in. and the 1½ in. are greater, particularly for the leaner mixes and earlier ages, it is small enough to indicate that differences for ranges in maximum sizes, such as from 1 to 1¼ in., are not of sufficient importance to justify the production of a special size not greatly different from a standard size."

It is also to be noted that the variations in strength were much greater in the leaner mixes. The 28-day strengths with 20% cement were: 1469, 1842, 1915 lb. and with 30% cement they were 3467, 3619 and 3751 lb.

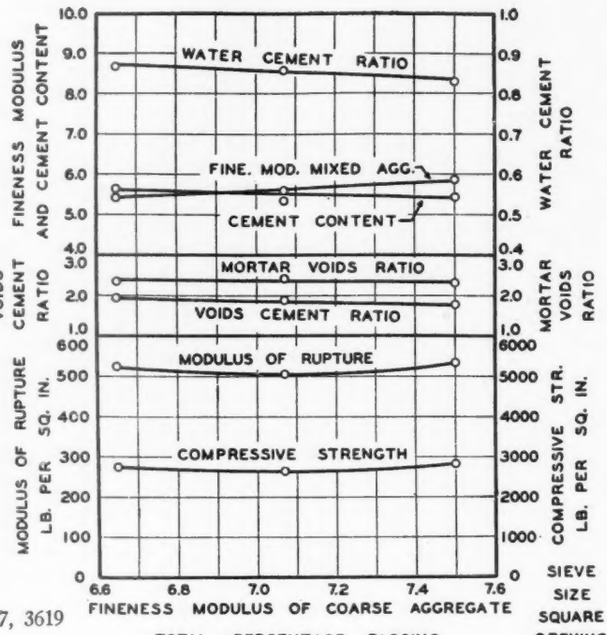
The U. S. Bureau of Public Roads tests, the "Report on Effect of Type and Gradation of Coarse Aggregate Upon the Strength of Concrete" by W. F. Kellerman of the Bureau, are discussed in only a brief paragraph in the paper, possibly because everyone interested is so familiar with it. The results of these tests are summarized in a table and the paper says concerning them:

"Comparing the highest strengths obtained for the 2-in. maximum size for compression, tension and modulus of rupture, with the results of the 1¼-in. maximum size, it will be seen that practically no differences in strength were obtained in spite of the fact that slightly less cement and a slightly higher water ratio were used with the small sizes. The three gradings of 2-in. maximum size gave practically identical strengths."

Effect of size and grading in fine aggregates has been studied in one series of tests made in the Association's laboratory. Some results were given in an abstract in the January 4, 1930, issue of Rock Products. A table in the paper summarizes them. As before only the trial mixes are shown here.

Gradings of sand	Fine	Medium	Coarse
Fineness modulus of sand	2.26	2.89	3.82
Fineness modulus of mixed aggregates (trial mix)	5.73	5.64	5.80
Water-cement ratio	0.84	0.85	0.85
Mortar-voids ratio	1.83	2.21	2.61
Compressive strength, lb. per sq. in.	3010	2905	2680
Modulus of rupture	560	525	515

The paper says of these sands that the strength ratios in tension were from 88 to 125% Ottawa, and in compression from 72 to 126% Ottawa, "but that the strengths of concrete in compression and flexure were not affected in a consistent manner and the variations were small." With the 1:2:3 mix and 1:3:4 mix the medium sand shows rather higher strengths. In the trial mix, given above, the strengths were practically uniform in all three sands except that the modulus of rupture with the fine sand was considerably higher than it was with any other test.



TOTAL	PERCENTAGE PASSING		SIEVE SIZE SQUARE OPENING
100	100	95	1 1/2"
75	58	40	3/4"
45	30	15	3/8"
10	5	0	NO. 4
5	0	0	NO. 8
0	0	0	NO. 16

Effect of variations in grading gravel within specification limits

Effect of Fine Sand

This uniformity of strength might make one wonder whether there is any effect of sand grading, on the strength of the concrete; but if one will look at the fineness moduli of the mixed aggregates he will see that the differences between them are small and that the finest sand did not make the lowest fineness modulus. It might even be thought from these tests that the sand required to produce equivalent workability with coarse aggregates of varying gradation approximates the sand required to produce equivalent fineness modulus and water-cement ratio. The paper says the tests of differences in sand grading are more favorable to the fine sand when fine gravel is used than when the comparisons are made with a medium or coarse graded gravel.

Figures of tests of sands and the concrete made from them, from the paper of Jackson and Pauls of the U. S. Bureau of Public Roads, "Accelerated Wear Tests of Concrete Pavements" are given. The paper says of the results:

"It will be noted that there was a wide range in the size, grading and mortar-strength ratio for the sand but not a corresponding range in properties of concrete. The values have been divided into two groups, one including sands having strength ratios of more than 100%, and the other for sands with strength ratios of less than 100%. It will be noted that practically no difference in the quality of concrete is shown by the averages of the two groups of tests; what difference there is seems to be in favor of the finer sands."

Three Points Clearly Indicated

Mr. Walker emphasizes the fact that the paper is a *review*, and while he does not want to outline definite conclusions he thinks that the following indications are clear:

(1) Variations in the maximum size of similarly graded coarse aggregates have comparatively little effect on the compressive and flexural strength of concretes for a wide range in maximum size. The data are definite in showing that there is no economy in placing a premium on one size as compared with another when differences in maximum size of the order of ½ in. are involved.

(2) Amounts of intermediate and finer sizes in aggregates of the same maximum size may vary over a relatively wide range without affecting the strength or yield of concrete an important amount. So far as strength and yield are concerned, the data are entirely definite in showing that usual specification limits are sufficiently rigid to insure uniformity; some advantages are exhibited for the coarse aggregates containing the higher percentages of smaller sizes. Definite conclusions as to the magnitude of casual variations in gradings which may be permitted depend on further knowledge of their effects on such factors as workability, segregation and volume changes of concrete.

(3) The ordinary interpretation of sieve analyses of sands does not give an accurate measure of their concrete-making properties. The strengths of sand mortars expressed as a ratio to the strength of similar standard sand mortars furnish no directly applicable information as to the concrete-making properties of sands. The few tests reviewed in this paper show equally good concrete strengths for sands having strength ratios less than 100% and greater than 100%.

Tabulations of the tests in detail are appended to the report, from which the figures here given are drawn. Several diagrams are also included, two of which are reproduced in this review.

Feeding Ground Limestone to Cattle

By C. W. McCampbell

Professor of Animal Husbandry, Kansas State Agricultural College, Manhattan, Kan.

ALL LIVESTOCK NEEDS CALCIUM. The younger the animal the more urgent the need. All feeds except the legume hays, which include alfalfa, clover, sweet clover, cowpea, soybean, etc., are more or less deficient in calcium. This deficiency of calcium in feeds other than legume hays may be emphasized by comparing the calcium content of a few feeds with the calcium content of alfalfa hay. One pound of alfalfa contains one hundred times as much calcium as a pound of shelled corn, thirty times as much as wheat, twenty times as much as bran, and nearly six times as much as cottonseed meal. These comparisons show that it is quite possible to have a well balanced ration for either fattening or stock cattle from the standpoint of protein and carbohydrates, that is not a satisfactory ration because of a calcium deficiency.

Calcium serves several important functions in the animal body. It helps to build up and maintain the bone tissue. Analyses of bones show 51% calcium phosphate, 11% calcium carbonate, and 5% other minerals. In other words, 62% of bone is made up of calcium combinations. Calcium is also necessary to insure proper functioning of the nervous system. It may also act as a neutralizer in the digestive tract. So we see that calcium plays an important part in maintaining the health and thrift of livestock, and if sufficient calcium is not present in the rations we are feeding them, calcium should be added to the ration fed. The question naturally arises as to the form in which it can be fed. The Kansas Agricultural Experiment Station ran a series of tests for the purpose of determining, if possible, the most satisfactory form in which calcium could be added to a livestock ration, both from the standpoint of efficiency and economy. These tests pointed to finely ground high calcium content limestone as the most satisfactory.

Ground Limestone Recommended

For cattle we recommend the use of one-tenth of a pound per head per day of ground limestone regardless of age. It is known that this is enough under any conditions and experiments indicate that no harm will come from feeding this amount. If it is not convenient to mix finely ground limestone with the feed, it can be mixed with the salt half and half and fed free choice. In some cases, especially where there is a decided deficiency of minerals in either or both feed and water, cattle will consume ground limestone when offered unmixed with any other material.

Our tests indicate that while good results can be secured when ground limestone is fed with a ration made up entirely of dry feed, better results are secured when it is combined with a ration a part of which is silage.

Results of Tests

The value of adding ground limestone to a ration containing no legume hay is shown in a three-year test conducted by the Kansas Station in which calves were full fed. Each year Lot 1 was fed corn, cottonseed meal, silage, and alfalfa hay; Lot 2, corn, cottonseed meal, silage, and prairie hay; Lot 3, corn, cottonseed meal, silage, prairie hay, and ground limestone. The ration fed Lot 1 contained plenty of calcium. The ration fed Lot 2 was low in calcium. The ration fed Lot 3 contained plenty of calcium but in the form of ground limestone instead of alfalfa hay. The average of the three tests are summarized in the following table:

Lot	1	2	3
Average daily ration:	pounds	pounds	pounds
Corn	10.30	10.00	10.18
Cottonseed meal	1.00	1.21	1.21
Alfalfa hay	2.00	.....	.....
Prairie hay	.....	1.59	1.62
Cane silage	9.76	8.54	9.49
Calcium carbonate or ground limestone	.....	.....	.10
Average daily gain per steer	2.37	2.12	2.40
Average selling price per cwt.	$10.83	$10.33	$10.75
Average profit per head.	$12.90	$ 6.00	$13.69

Particular attention is directed to the drop in ultimate profit in Lot 2 where prairie hay was substituted for alfalfa hay and the return in ultimate profit in Lot 3 where the ground limestone was substituted for the alfalfa hay.

Another series of tests conducted at the Kansas Station indicates that just as good results may be secured in fattening calves for market on a ration consisting of corn, cottonseed meal, silage, and finely ground limestone as can be secured by using the so-called corn belt ration consisting of corn, cottonseed meal, silage, and alfalfa or clover hay.

What Kind of Limestone?

There is a considerable variation in the feeding value of the ground limestone offered for sale by different firms. A satisfactory product should contain at least 95% calcium carbonate, no fluorine, and very little magnesium. It must be ground very fine for livestock feeding purposes—almost as fine as wheat flour. Ordinary fertilizer lime is not ground fine enough for livestock feeding purposes.

Editor's Note

***PRODUCERS** of ground limestone have generally realized the value of their product to farmers via the indirect route—that is, limestone applied to the soil, absorbed by crops, such as alfalfa, and fed to livestock.*

Probably few producers realize that the same product, much more finely ground, fed direct to live stock, is a coming thing. The article herewith is immensely illuminating and interesting.

We once suggested, editorially, that limestone producers might some day make a product to be used on dining tables as freely as common salt is now used. To judge by Prof. Campbell's experiments, such an ultimate market for limestone products is not so far-fetched after all.—The Editor.

Standards for Nonmetallic Minerals and Their Products

"STANDARDS AND SPECIFICATIONS for Non-Metallic Minerals and Their Products" has been published under date of April, 1930, by the Bureau of Standards, U. S. Department of Commerce, and copies may be obtained from the Superintendent of Documents, Washington, D. C.

This 680-page volume is a compilation, either in full or adequately abstracted, of every available nationally recognized standard and specification which has been formulated by the various national technical societies and trade associations.

Pages 182 to 483 are given over to standards and specifications for stone, sand and cementitious materials, including cements, lime, gypsum, aggregates, construction methods, etc.

The volume shows to what extent standardization has been accomplished, and also shows that in some fields there is need of further standardization because of the differences in specifications. Although simplification and standardization are being carried forward more and more rapidly by the commercial standardization group of the Bureau of Standards in co-operation with the American Standards Association, much yet remains to be done.

In order to keep the collection of specifications as accurate and complete and up-to-date as possible, the bureau will welcome suggestions or criticisms.

One Real Stone-Washing Problem

Louisiana Quarry Co., Winnfield, La., to Wash Approximately 200 Tons Per Hour

AT WINNFIELD, LA., in the north-central part of the state, a new crushed-stone plant is being built to provide stone for the large state road-building program now under way.

According to the present program it is expected that the state will spend within the next 16 months upward of $70,000,000 for road work, a considerable part of which will be for new concrete roads.

Contracts for a large part of this have already been let and engineering work on the balance is being carried on as rapidly as possible.

In order to provide for the crushed stone requirements the Louisiana Quarry Co., Inc., Winnfield, La., was formed and entered into a contract with the state to furnish 1,000,000 tons of stone, this to be supplied from a new plant to be built by the company.

Also the property of the Southern Mineral Co., of which I. L. Lyons, Jr., is president, and whose general offices are in New Orleans, consisting of the quarry and crushing plant at Winnfield, was leased last December to the Louisiana Quarry Co. for the term of the contract.

The new plant, which will have a capacity of something over 200 tons per hour, adjoins the old plant of the Southern Mineral Co. and will revert to it upon completion of the contract. The stone for this work will be obtained by enlarging the present quarry.

R. S. Wilson, president of the Big Rock Stone and Material Co., Little Rock, Ark., is president of the Louisiana Quarry Co., Inc.; A. C. Butterworth, president of General Material Co., St. Louis, Mo., is secretary and treasurer; and R. S. Wilson, Jr., is general manager and in charge of the Winnfield operation.

View during construction, with one of the scrubbers ready for installation

An interesting feature of the contract is that the state will take the stone at the plant as fast as produced and dispose of it either by shipping direct to jobs or storing at advantageous points.

All Material Will Be Washed

Because of the boulder formation of this quarry and the clay overlying it and occurring in the seams of the rock, all material will be washed. Three Allis-Chalmers 6x20-ft. scrubbers have been installed for this purpose.

The quarry is interesting as being the only outcropping of limestone in the state, and as overlying one of the salt domes of this section, salt occurring at a depth of about 400 ft. with a deposit of gypsum between the limestone and the salt.

Also of interest is the amount of incidental work necessary in carrying the project through. In order to provide a better and shorter rail connection with the plant a new railroad line 2½ miles long is being built by Gifford-Hill and Co. for the Louisiana and Arkansas Railway Co. The Louisiana Power and Light Co. is constructing a 70-mile power line in to the plant, and a dam is being built to impound water for washing.

It is expected to have this work completed and the crushing plant ready for operation early in April.

The crushing, screening and washing equipment for the plant was furnished by the Allis-Chalmers Manufacturing Co., Milwaukee, Wis., which also made the plans, and the main belt conveyor was supplied by the Stephens-Adamson Manufacturing Co., Aurora, Ill.

The plant is of heavy timber construction.

A crane of large capacity was used in construction

Crushing, Screening and Washing Plant

A No. 12K gyratory crusher located in a pit below the present quarry floor will receive the raw material, discharging directly to a 36-in. by 320-ft. inclined belt conveyor carrying up to the primary scalping screens and washers on the upper level.

Ten double-deck vibrating screens, 4 ft. wide by 8 ft. long will be used for sizing.

From the main belt conveyor the material will be scalped over two screens with 2½-in. mesh top decks and 1-in. mesh bottom decks, from both of which the minus 1-in. material will be further screened over

a single screen to take out the fines. The 2½-in. by 1-in. material and also the size from 1-in. down to sand from these three screens goes directly to three parallel 6-ft. by 20-ft. Allis-Chalmers drum type revolving scrubbers and then on to three vibrating screens to take out the fine material.

The oversize from the top deck of the two scalping screens will be recrushed by two 10-in. Newhouse crushers.

Screw Washers for Fines

Allis-Chalmers inclined screw type log washers will be used for washing the fine material, which will be carried up to the bins in a 16-in. belt bucket elevator.

All of the other material will be carried up by a 36-in. belt bucket elevator and sized over the bins by four vibrating screens, with water jets for final washing.

The bins, of heavy timber construction, have five compartments with bottom bin gates for loading railway cars below.

The water required for washing is to be taken from the quarry drainage pumps so far as possible, augmented by additional water as may be necessary from the dam and pond already mentioned. In order to accomplish this, five 15,000 gal. steel tanks connected together by a header to give 75,000 gal. storage capacity are located alongside the plant and the 3000 g.p.m. high pressure centrifugal pump furnishing wash water to the plant will draw its supply from these tanks. They will be kept filled from the quarry drainage and also as may be necessary from the pond by a remote-control low-head centrifugal pump and sluiceway.

Quarrying

Six 15-ton Hug trucks with Easton end-dump bodies will be used for quarry transportation. These will be of the self-dumping type, and an air hoist will be used over the crusher to help handle any large pieces.

At present the old plant is being supplied by small side-dump cars operated on 24-in. gage tracks by both steam dinkies and Plymouth gasoline locomotives.

The quarry is equipped with one 100B Bucyrus-Erie crawler shovel, and one 75-ton shovel of the Thew-Lorain crawler type, driven by gasoline engine.

Work started on this project January 19. Since that date, 72 miles of power lines have been completed, 2½ miles of railroad, a 75-acre impounding lake and the plant, which is expected to start April 1.

Construction of loading bins

Looking into quarry, with primary crusher pit in center

Sale of Quarry Refused

A PROPOSAL to buy the 27 acre water-filled quarry owned by the National Lime and Stone Co. at Bluffton, Ohio, and convert it into a reserve water supply reservoir for the municipality is at a standstill with the present trend indicating that the deal will not go through.

Engineer Knoblauch of the National Lime and Stone firm, who conferred with town heads, indicated that arrangements might be made with the company for the leasing of the quarry but the company would not consider sale of the property at this time.

The leasing proposal has found little favorable sentiment here. Town officials indicated that they would not be interested in leasing the quarry as the water supply is not needed at the present and there would be no assurance under the leasing proposal of having the supply available at a time in the future when it might be needed.

Officials of the company declined to sell the property on the grounds that future developments in this section might warrant the re-opening of the quarry which was closed in 1929 following a $200,000 fire which destroyed the main plant building.—*Bluffton* (Ohio) *News.*

Los Angeles Has Ambitions as Port of Export for Phosphate

START OF OPERATIONS of a commercial fertilizer plant at San Pedro (Los Angeles Harbor), using about 100 tons daily of Idaho phosphate rock, calls attention to possible future developments along this line. Los Angeles suggests that annual shipment of 3,000,000 tons of this rock from that port may ultimately be developed. Mining of phosphate rock in Florida has become unduly expensive and operations in Kentucky are reduced. The California company is Agricultural Potassium Phosphate Co.—*Seattle* (Wash.) *Business Chronicle*

Blast Furnace Slag as Concrete Aggregate

Abstract by Edmund Shaw
Contributing Editor, Rock Products

COMMITTEE 201 of the American Concrete Institute has presented a very comprehensive report on blast furnace slag as concrete aggregate, covering 30 pages of the society's *Journal*. A list of national organizations which have approved the use of slag aggregate shows its use to be widespread although it forms only 4% of the tonnage of all aggregates. However, it is important in that the use is concentrated in the large centers of population which have steel mills.

The committee inspected 115 miles of concrete paving, besides many factories, warehouses, bridges, docks and other structures of slag concrete which had given long years of service.

The report gives the method of preparing slag, beginning at the furnace. Most companies use the modified pit system by which the slag is poured in long pits and allowed to cool slowly. This gives a tempering that toughens the slag although "aging," which was formerly thought to be necessary, is no longer practiced. Much slag in Ohio is excavated after less than two weeks in the pit. The bank system of slag disposal calls for large areas of land and has other disadvantages that tend to its disuse. Except that iron has to be removed, the remaining preparation of slag is like that of crushed stone.

The total production of slag in the United States is about 10,000,000 tons, about 30% of this being used as concrete aggregate.

Physical and Chemical Characteristics

Air cooled crushed blast furnace slag is rough and angular, colored from light to dark gray. The roughness comes from its cellular structure. The cells are formed by gases held in the cooling slag. It is better described as "vesicular" or "cellular" than porous. It breaks into rough cubical pieces and the cellular structure combined with angular shape gives slag a larger surface area than other aggregates.

The apparent specific gravity ranges from 1.80 to 2.80, averaging about 2.25. The true specific gravity of the solid material ranges from 3.00 to 3.10. The weight per cu. ft. varies from 65 lb. to 100 lb. but the highest weight in concrete aggregate sizes is about 85 lb. These are dry compacted values. If weighed loose the cubic foot weight is about 10 lb. less.

Voids are determined by the water displacement methods at 40 to 45%, average 42%, in slag sold for concrete aggregate. It is difficult to get a representative sample from which to determine voids by the volume and specific gravity method.

Absorption tests range widely but the majority lie within 2½ to 4½%, the average being 4%. This is by weight. The low apparent specific gravity of slags gives a wrong idea of the absorption by volume. Slag of 2.21 sp. gr. and absorption of 6% has the same absorption by volume as stone of 2.65 sp. gr. and absorption by weight of 5%. The absorption that takes place in the first 30 min. is usually that considered in mixing slag concrete where the mixing water is under control.

Hardness and toughness are meaningless as applied to slag and are no longer mentioned in specifications.

Testing slag for abrasion in the Deval machine meets the same difficulties as the specific gravity and absorption tests, the greatest being that of getting representative samples. Variations in the standard Deval test are from 2½% to 43%; averages run from 12% to 16%. The modified Deval test, with steel balls added, gives a range of 15% to 38% wear, averaging about 25%.

The report gives results of abrasion tests from different laboratories which show the impossibility of obtaining concordant results on uniform samples of slag and recommends that they be omitted from specifications for slag aggregate.

The crushing strength of slag is 9000 to 12,000 lb., about the same as that of other aggregates most commonly used. The cementation value varies very widely, slags with a large percentage of calcium oxide having a high cementing value. The melting point varies from 2300 to 2600 deg. F. Slag is solid at 2100 deg. F. and lower.

Chemically slag is made up of calcium oxide, alumina, silica and magnesia with small quantities of iron and manganese oxides and sulphur compounds. The chemical composition varies at different sources but is remarkably uniform in the slag from any one source. The tables given show about 45% of CaO, 36% SiO_2 and 13% Al_2O_3. Petrographically, slag is composed of silicates, such as dicalcium silicate and calcium alumino-silicate.

Properties of Slag Concrete

The average weight of slag concrete may be taken at 135 lb. per cu. ft. for such mixes as 1:2:3, 1:2½:4, etc., where slag of 70-80 lb. per cu. ft. is used as the coarse aggregate. Rich mixes with more cement and sand weigh more.

The average of all available absorption tests on slag concrete is given by the report at 5.5% by weight. By volume this corresponds to 5% absorption in heavier concretes.

"Bond" in concrete, the report says, may mean either adhesion of concrete and reinforcing steel or adhesion between mortar and coarse aggregate. The bond of steel with concrete being a function of the mortar, it is the same for slag concretes as for other concretes.

With respect to adhesion between mortar and coarse aggregate, the rough pitted surface and angularity of fragments aid the mortar in obtaining a high degree of bond. Tests on slag concrete seldom show failure of bond between mortar and slag. The report quotes Sanford E. Thompson, in substance, that in addition to the effect of rough and pitted surface there is probably some chemical action between the slag and the mortar. This is shown by a ring of different color around the slag.

Best Test Is Filtering Sewage

The durability of slag concrete has been tested in thousands of structures for over fifty years. The durability of slag aggregate as shown by the sodium sulphate and other tests is discussed at considerable length in the report. This includes the work of Hommon, Gascoigne, Hubbard, Orton and the U. S. Bureau of Standards. But the report states that probably the best test for the durability of any aggregate is its behavior as a filtering medium in sewage beds. The report quotes the survey of Hommon on all the slag filter beds which could be found in the United States, some of them 10 to 21 years old. At 29 out of 37 plants, crumbling and flaking were either not present or it was necessary to examine closely to find them. At 26 plants the same condition obtained in regard to splitting. At the plants where splitting and crumbling were found the total amount was comparatively small and would have no effect on the operation of the filters. Gascoigne's tests of material exposed in a colander to filtering sprays for 13 months are also given in some detail. They showed 20% of 2 to 3-in. pieces broke to pieces over 1-in., and that from 0 to 7% of 3/16-in. to 1-in. pieces were made.

The exception of "limy" slag that tends to crumble on cooling is noted and it is shown that if slag is poured in thin layers to cool it quickly, the calcium orthosilicate which crumbles in the "gamma" form is arrested in the "beta" form which is stable. Where such slag has already gone to powder the powder is taken out by the crushing plant screens.

Slag concrete also receives its severest test in connection with sewage disposal beds and, according to the report, it has given entire satisfaction in nineteen such beds in the United States.

The report discusses in detail the possibil-

ity of the sulphur compounds in slag attacking reinforcing steel. The reports of Committee C-9 of the American Society for Testing Materials and of the Masonry committee of the American Railway Engineering Association are quoted to show that no case has been reported where the steel has been attacked in this way. Quotations from a report by the U. S. Bureau of Standards show that tests made by the Bureau of Standards revealed no disintegration due to sulphur or sulphides. Reports by Sanford E. Thompson and A. T. Goldbeck say there is no case reported of a well defined corrosive action on reinforcing steel in slag aggregate. Seven other engineers are mentioned as testifying to the durability of slag concrete.

About three pages of the report are given to the fire resisting qualities of slag concrete, quoting tests made in England and Germany as well as the United States. All these show slag concrete to have about as high fire resistance as concretes of limestone and basalt aggregates.

Compressive and Transverse Strength

The report* says that more data have been compiled on the compressive strength of concrete than any other quality. Other things being equal it has been found that there is little difference in the compressive strengths of concretes employing the more common mineral aggregates. To substantiate this the report quotes many reported tests, beginning with that of the Portland Cement Association on 19 slags, 27 gravels, 36 limestones, 14 granites, 11 sandstones and 14 traprocks. Two gradings, "A" and "B," were used. The average of "A" gradings was 4393 lb. Taking this as 100, the averages of the individual aggregates were: limestone, 103; sandstone, 101; granite, 99; gravel, 98; slag, 97; and traprock, 96. For the "B" grading the standing was: limestone, 102; traprock, 101; granite, 99; slag, 98; gravel, 97. "It is apparent," says the report, "that the difference between aggregates is not sufficient to justify precedence of one over the other."

It is also apparent that one may prove almost anything about the comparative value of aggregates by quoting from published series of tests. In this report the tests of Abrams are given in which the standing was: gravel, 115; slag, 105; limestone, 91; and granite, 97. In the Kellerman report of the Bureau of Public Roads tests the relative strengths were: sandstone, 113; limestone, 100; gravel, 99; slag, 96; and traprock, 94. But in Harsch's investigations for the U. S. Bureau of Standards, the relative strengths were: slag, 104; stone, 95; and gravel, 85.

Almost as confusing are the results on transverse strength except that in general the slag concretes are relatively higher. But more interesting than tests on types of aggregates are the transverse strength tests on slag concrete by itself. These are from the Ohio and Pennsylvania highway departments. Tests on 370 beams made on a portable machine by the Ohio highway department showed high transverse strengths at all ages from three days to 28 days. Significant figures from the table given are: 102 beams at 7 days, 656 lb.; 102 beams at 14 days, 732 lb.; 85 beams at 28 days, 810 lb. These were averages from all concrete slag pavements built in 1928.

The report notes that the type of testing machine or type of specimen, or both, affect the result, and comparative tests on the Ohio and the Illinois machines on 1:5 and 1:5½ slag concretes are shown. The average of all transverse strengths on the Illinois machine was 619.7 lb. and on the Ohio machine 755 lb. or about 22% more. In this series slags weighing from 61 to 89 lb. per cu. ft. were used. The heaviest slag had a slight advantage at 7 days but this disappeared at 28 days.

The Pennsylvania Highway Department tested 1312 beams of slag concrete, 6470 of stone and 618 of gravel. The tables show that for all mixes and ages slag concrete had a higher transverse strength than either stone or gravel concrete and that in all cases but two the stone concrete was stronger than gravel concrete although the difference was not so much. The well-known Kellerman tests are also quoted to show the relative transverse strength of slag.

Resistance to wear was shown by the circular track experiment of the Bureau of Public Roads in which slag was intermediate between stone and gravel.

The toughness of concrete was tested by the Pennsylvania Highway Department in 1919-20 on both molded and drilled cylinders. The average coefficient of all cylinders was 133. Taking this as 100 the relative standing was: sandstone, 83; limestone, 84; slate, 115; slag, 117; and gravel, 130. But Prof. Myers has shown slag concrete to be tougher than either limestone or gravel concrete in a 1:2:4 mix.

The most important item under the heading "Workability" is that so-called oversanded mixes with slag are not only more workable but show maximum economy in cement.

The reluctance of engineers to use fine slag aggregate in the place of natural sand is discussed. It is admitted that fine slag mixtures may be less workable but the report says that the workability may be improved by adding a portion of fine sand, powdered slag, diatomaceous earth or hydrated lime to the mix.

The durability and strength of concretes made with slag fine aggregate seem to be unquestioned, according to the report. It notes the satisfactory service of houses and bridges built 1916 to 1923 with either fine slag aggregate or a mixture of sand and slag as fine aggregate.

*This report has been reprinted and copies can be secured from the National Slag Association, 937 Leader Bldg., Cleveland, Ohio.

Pennsylvania Geological Survey Issues Report

THE 1930 administrative report by George H. Ashley, state geologist, Harrisburg, Penn., has just been published, setting forth the work done by the Topographic and Geologic Survey of Pennsylvania.

This work has included both geologic surveys with detailed geologic maps covering the various mineral resources of the state as well as extensive topographic surveys. About 81% of the area of the state has been mapped to date, and it is estimated that at the present rate eight years will be required to complete the topographic mapping.

In addition, many papers and bulletins have been published and information given both in person and by letter on the mineral resources of the state.

It is estimated that the survey has saved the citizens of the state many times its cost in the one phase of helping to prevent unwise mineral development or unwise investment in mineral promotions and in properties where minerals have been found.

National Safety Council Transactions

THE TRANSACTIONS of the 19th annual safety congress held at Pittsburgh, Penn., September 29 to October 3, 1930, have recently been published by the National Safety Council, 20 North Wacker drive, Chicago, Ill.

Besides the proceedings of the general sessions, covered by 248 pages, those of the cement and quarry sections, covered by 50 pages, are available separately as reprints from the complete transactions and form a valuable safety manual.

Included in the transactions of the cement and quarry sections, presided over by A. L. Worthen, Connecticut Quarries Co., New Haven, Conn., general chairman, are the papers given by Otho M. Graves, General Crushed Stone Co., Easton, Penn.; W. E. Hilliard, New Haven Trap Rock Co., New Haven, Conn.; Col. Henry A. Reninger, Lehigh Portland Cement Co., and others on various features of safety work.

Granite for Crushed Stone on Royalty of 5c Per Ton

STEWART CORNWELL, residing seven miles north of Plainfield in Portage county, Wisconsin, has signed a contract to dispose of stone on his farm for 5c per ton to the Red Granite Quarry Co., of Red Granite. Blasting operations will begin March 1, if the weather permits. Large cranes, hoists and engines will be operated in loading the stone, which will be hauled by truck to railroad cars and will be shipped to all parts. The stone will be crushed and used for special aggregate.—*Antigo* (Wis.) *Journal.*

Researches on the Rotary Kiln in Cement Manufacture†

Part XV—Weight of Clinker Producible Using Combustion Gases of Different Flame Temperatures and Supplying 10.478 Lb. of Air Per 1 Lb. of Standard Coal Burned

By Geoffrey Martin

D.Sc. (London and Bristol), Ph.D., F.I.C., F.C.S., M. Inst. Chem. Eng., M. Inst. Struct. Eng., M. Soc. Pub. Analysts, F. Inst. Fuels; Chemical Engineer and Consultant; Former Director of Research of the British Portland Cement Research Association; Author of "Chemical Engineering"

THE coal dust when fired into the kiln oxidizes very rapidly into a mass of hot gases which (as some calculations made below will show) must be considered as the main heating agent in the rotary kiln.

One pound of standard coal yields 11.278 lb. of hot combustion gas, which, in the ordinary cement kiln, starts at an initial temperature of about 2600 deg. F. (1427 deg. C) and travels down the kiln and imparts its heat to the raw material in the kiln.

1481 deg. F.

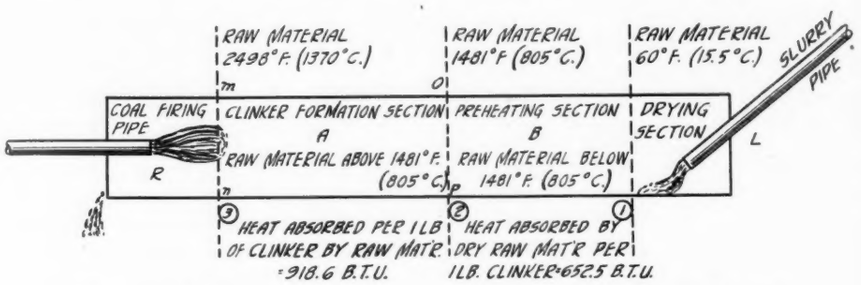
Above 1481 deg. F.	Below 1481 deg. F.
A Clinkering and decarbonating zone.	*B* Preheating and drying zone.

The kiln may be divided into two parts—a portion *A*, where the temperature inside the kiln is *above* 1481 deg. F. (805 deg. C.), and a portion *B*, where the zone is below 1481 deg. F. (805 deg. C.).

As 1481 deg. F. (805 deg. C.) is the temperature whereat calcium carbonate begins to decompose in the furnace, no clinker can be formed until the stone or chalk does decompose.

So that any heat escaping past the *line* dividing the *A* portion of the kiln from the *B* portion is completely lost so far as actual cement formation is concerned—the heat thus escaping being merely employed in preheating and drying the raw material preparatory for its conversion into clinker.

The quantity of clinker formed, therefore, is measured by the amount of heat *absorbed* by the raw material between 1481 deg. F. (805 deg. C.) and the clinkering temperature (2498 deg. F.). This quantity of heat Q must, in the ideal case, be equal to the amount of heat given out by the hot gas between the time of entering the kiln at *mn* and leaving it at *op* (since no radiation and conduction loss occurs).



Theoretical division of kiln at point where temperature is 1481 deg. F.

If the combustion gas from 1 lb. of coal starts in the section *A* at its maximum temperature of *T* deg. F., and leaves the section *A* at the temperature 1,481 deg. F., the amount of heat it has given up by the 11.278 lb. of gas passing down the section *A* is

$$Q = 11.278 \cdot S \cdot (T - 1481) \text{ B.t.u.}$$

where S = the specific heat of the gas.

To form 1 lb. of clinker requires the absorption of 918.6 B.t.u. by the raw material between 1,481 deg. F. and its clinkering temperature (see Part V). So that the weight in pounds of clinker formed by the 11.278 lb. of hot gas (= 1 lb. of standard coal) in the section *A* is

$$W = \frac{Q}{918.6} = \frac{11.278 \cdot S \cdot (T - 1481 \text{ deg.})}{918.6} \quad (1)$$

For some purposes the following formula is somewhat more convenient for use in calculating W, although, in fact, it is the same formula as (1).

If W is the number of lb. of clinker producible by 1 lb. of standard coal—

Synopsis

IN THIS installment the author discusses the rotary kiln as an instrument or device for transferring the heat of coal burned to material being calcined and clinkered. The ideal rotary kiln would have a fuel ratio of 6.36% (6.36 tons of coal to 100 tons of cement clinker). Ordinary wet-process kilns have an efficiency of only 22.7% (28 tons of coal per 100 tons of clinker).

The author's conclusion is that the hot gases traverse the kiln too rapidly to use all their effective heat in the decarbonating zone. Heating in the kiln is carried out by the hot gases and is measured by the heat loss from the gas as it passes down the kiln.

Hence, to increase the clinker output it is vitally necessary to increase the flame temperature in the clinkering zone; that is, the higher the flame temperature, the greater the clinker output per ton of coal burned.—The Editor.

In order to connect the *rate* of formation of the clinker with the amount of coal burnt, we proceed as follows:

$$W = \frac{\text{B.t.u. contained in combustion gases from 1 lb. coal above 1481 deg. F.}}{\text{B.t.u. necessary to form 1 lb. of clinker above 1481 deg. F.}}$$

$$= \frac{\left\{\begin{array}{c}12{,}600 + \text{B.t.u. in 10.468 lb.} \\ \text{of preheated air}\end{array}\right\} - \left\{\begin{array}{c}\text{B.t.u. in combustion gas be-} \\ \text{tween 1481 and 60 deg. F.}\end{array}\right\}}{918.6}$$

In t sec. the kiln consumes 1 lb. of standard coal, and therefore produces 11.278 lb. of combustion gas. Hence in t sec. 11.278 lb. of combustion gas enter the section A at temperature T deg. F., and 11.278 lb. simultaneously leave it at a temperature 1481 deg. F.; the heat, therefore, lost by the hot gas in t sec. in the section A is equal to the heat lost by 11.278 lb. of gas sinking from T deg to 1481 deg. F. So that in t sec. the amount of heat absorbed by the raw material in A is

$$Q = 11.278 \cdot S \cdot (T - 1481) \text{ B.t.u.}$$

and therefore the amount of *clinker* produced in t sec. is

$$W = \frac{11.278 \cdot S \cdot (T - 1481)}{918.6} \text{ B.t.u. . . .(1)}$$

So that the amount of clinker produced by the kiln in 1 sec. is

$$\frac{W}{t} = \frac{11.278 \cdot S \cdot (T - 1481)}{918.6t} \text{ lb. . . . .(2)}$$

and the tonnage producible per *hour* by the kiln is

$$\frac{11.278 \cdot S \cdot (T - 1481) \times 3600}{918.6 \times t \times 2400} \text{ tons . .(3)}$$

The next step is to calculate the amount of heat which can be liberated by the 11.278 lb. of the combustion gas (= 1 lb. of standard coal) in sinking from various flame temperatures down to 1481 deg. F.

On dividing this amount of heat by 918.6 (representing the number of B.t.u. which must be absorbed by the raw material between 1481 deg. F. and the clinkering temperature in order to produce 1 lb. of clinker) we get the number of pounds of clinker producible by 1 lb. of standard coal under these circumstances.

These calculations are carried out in the following Table I.

The various theoretical flame temperatures tabulated in Table III, Part XIII, are placed in column 1.

The mean specific heat S of the furnace gases between T deg. and 1481 deg. is next taken from Table II, Part XII. Then the required quantity of heat in column 2 is calculated by the formula

$$Q = 11.278 \times S \times (T - 1481 \text{ deg.})$$

Column 3 then gives the weight of clinker theoretically producible per 1 lb. of coal burnt in the upper part of the kiln, which, for convenience for the manufacturer, is reduced to tons of standard coal consumed per 100 tons of cement in the next column (4).

For convenience' sake I have added in column 5 the temperature to which the entering air must be preheated in order to obtain the flame temperatures indicated in column 1.

A study of Table I leads to the following important conclusions:

(1) An ideal kiln, subject to no losses of any kind, could produce 100 tons* of cement clinker by the combustion of 6.36 tons* of standard coal.

The ordinary wet process rotary kiln is supposed to be doing well when it produces 100 tons* of clinker for 28 tons* of standard coal, so that the efficiency of the ordinary kiln is only

$$\frac{6.36 \times 100}{28} = 22.7\%.$$

*Tons in every instance are British tons of 2240 lb. To convert to American tons of 2000 lb. multiply by 1.12.

TABLE I—HEAT REQUIREMENTS FOR PRODUCING THEORETICAL AMOUNTS OF CLINKER

(1) A theoretical maximum flame temperature (as calculated in Table III, Part XIII)		(2) B.t.u.'s liberated by 11.278 lb. of combustion gas falling from T deg. to 1481 deg. F.	(3) Lb. of clinker theoretically productible per 1 lb. of standard coal of 12,600 Bt.u. burnt in upper part of kiln	(4) Tons of standard coal consumed per 100 tons* clinker produced	(5) Temperature of preheated air for coal combustion	
T		$Q = 11.278 \times S \times (T - 1481)$	$\frac{Q}{918.6} = W$	$\frac{918.6 \times 100}{Q}$	t deg.	
deg. F.	deg. C.	B.t.u.			deg. F.	deg. C.
5370	2966	14,452	15.732	6.36	2500	1371
5301	2927	14,160	15.414	6.49	2400	1315
5224	2885	13,873	15.102	6.62	2300	1260
5147	2842	13,589	14.793	6.76	2200	1204
5071	2800	13,306	14.485	6.90	2100	1149
4995	2757	13,023	14.177	7.05	2000	1093
4936	2725	12,744	13.873	7.21	1900	1038
4862	2683	12,470	13.575	7.37	1800	982
4805	2652	12,191	13.271	7.53	1700	926
4706	2597	11,915	12.972	7.71	1600	871
4645	2563	11,643	12.675	7.89	1500	815
4586	2530	11,378	12.386	8.07	1400	760
4525	2496	11,110	12.094	8.27	1300	704
4465	2463	10,845	11.806	8.47	1200	649
4405	2430	10,584	11.522	8.68	1100	594
4344	2396	10,324	11.239	8.90	1000	548
4282	2361	10,062	10.954	9.13	900	483
4222	2328	9,806	10.675	9.37	800	427
4160	2293	9,551	10.397	9.62	700	371
4100	2260	9,301	10.125	9.88	600	315
4038	2226	9,048	9.8498	10.15	500	260
3977	2192	8,800	9.580	10.44	400	204
3916	2158	8,553	9.311	10.74	300	149
3855	2124	8,309	9.045	11.06	200	93
3794	2090	8,070	8.785	11.38	100	38
3769	2076	7,972	8.680	11.52	60	16
3700	2038	7,718	8.408	11.89	.....	.....
3600	1982	7,334	7.984	12.52	.....	.....
3500	1926	6,954	7.570	13.21	.....	.....
3400	1872	6,582	7.165	13.96	.....	.....
3300	1816	6,210	6.761	14.79	.....	.....
3200	1760	5,841	6.359	15.73	.....	.....
3100	1704	5,478	5.963	16.77	.....	.....
3000	1649	5,115	5.568	17.96	.....	.....
2900	1594	4,759	5.181	19.30	.....	.....
2800	1538	4,405	4.795	20.85	.....	.....
2700	1482	4,053	4.413	22.66	.....	.....
2600	1427	3,704	4.032	24.80	.....	.....
2590	1421	3,668	3.993	25.04	.....	.....
2580	1415	3,634	3.956	25.28	.....	.....
2570	1410	3,600	3.919	25.52	.....	.....
2560	1404	3,566	3.882	25.76	.....	.....
2550	1399	3,530	3.843	26.02	.....	.....
2540	1393	3,496	3.806	26.27	.....	.....
2530	1388	3,462	3.769	26.53	.....	.....
2520	1382	3,427	3.731	26.80	.....	.....
2510	1377	3,392	3.693	27.08	.....	.....
2500	1371	3,358	3.656	27.35	.....	.....
2490	1365	3,324	3.619	27.63	.....	.....
2480	1360	3,290	3.582	27.92	.....	.....
2470	1354	3,256	3.545	28.21	.....	.....
2460	1349	3,221	3.507	28.51	.....	.....
2450	1349	3,221	3.460	28.83	.....	.....
2440	1337	3,153	3.432	29.14	.....	.....
2430	1332	3,119	3.395	29.45	.....	.....
2420	1327	3,085	3.359	29.77	.....	.....
2410	1321	3,050	3.320	30.12	.....	.....
2400	1315	3,016	3.283	30.46	.....	.....
2300	1260	2,677	2.915	34.30	.....	.....
2200	1204	2,341	2.549	39.25	.....	.....
2100	1149	2,007	2.185	45.77	.....	.....
2000	1093	1,676	1.824	54.82	.....	.....
1900	1038	1,347	1.466	70.13	.....	.....
1800	982	1,021	1.111	90.00	.....	.....
1700	926	698	0.760	131.58	.....	.....
1600	871	378	0.411	243.31	.....	.....
1500	815	60	0.065	1538.46	.....	.....
1481	805	0	0.00	Infinite	.....	.....

There is, therefore, much room for improvement in the rotary kiln.

(2) In an actual rotary kiln the *practically observed flame temperatures correspond with the theoretical output of clinker appertaining to that temperature.* Thus the observed flame temperature of 2600 deg. F. corresponds with a clinker output of 100 tons* per 24.80 tons* coal fired.

This has actually been achieved in kilns belonging to certain works, and means that the gases, starting at 2600 deg. F., actually give up all *their effective heat* to the raw material (*i. e.,* the gases escape from the decarbonating zone at a temperature degree of 1481 deg. F., so that they have given up all their effective heat to the raw material). In most kilns, however, the output is 28 to 30 tons* of coal per 100 tons* clinker, the *reason being* that the combustion gases *travel so quickly down the kiln* that they escape from the *decarbonating zone* not a 1481 deg. F., but at, say, 1,700 deg. F., so that the effective heat has not been communicated to the raw material. This is dealt with in the next chapter.

(3) The fact that the *practically observed flame temperatures agree with clinker output in practice leads to the most important practical conclusion that the heating in the kiln is indeed carried out by the hot gas and is measured by the heat loss from the gas as it passes down the kiln.*

The importance of this conclusion is this: It follows that if you wish to increase the yield of clinker much beyond 100 tons* per 24 tons* of standard coal, *it is absolutely vital to increase the flame temperature in the clinkering zone.*

From equation (1), if W is the weight of clinker formed per 1 lb. of coal burnt and T is the flame temperature—

$$W = \frac{11.278 \cdot S \cdot (T - 1481)}{918.6},$$

or $$W = \text{constant} \times (T - 1481).$$

Hence the higher is T, the *larger* is W.

How the flame temperature can be increased without ruining the lining will be explained in a later chapter.‡ It forms a vital element in the design of a kiln.

(4) *The higher the flame temperature of the gaseous mixture, the greater the clinker output per 1 lb. of coal burnt.*

‡In Vol. II of this Report, not yet written because the British Portland Cement Research Association was dissolved before the work could be completed.

This is a conclusion of great practical importance. Any influence which diminishes the flame temperature of the gases necessarily diminishes the clinker output per 1 lb. of coal burnt.

The subject will be treated again in a later installment, and the influence of excess of air on clinker output will be examined and shown to be deleterious.

(*To be continued*)

Home-Town Exhibit of Quarry Products

A DISPLAY of the Mid-West Rock Products Corp. has been placed in the window of the Moss and Money drug store at Spencer, Ind., which gives samples of the materials produced at the quarry and plant west of this city. The samples include liming stock food, asphalt filler, natural whiting, agricultural stone, driveway chips, pulverized limestone dust, concrete macadam, railroad ballast and water bound base road stone.

The plant west of Spencer, where the hard white limestone of this area is quarried, has been in operation for a good many years. D. S. Pickett is sales manager of the corporation, Kenneth Noel, office clerk, and W. C. Thomas, plant manager.

According to cards in the display window, the payroll of the plant last year was $27,000 with bonuses amounting to $1,400. Stone crushed during the past year amounted to 111,000 tons and stone shipped was 108,000 tons. The average number of employes was 30.—*Spencer* (Ind.) *World.*

Virginia Greenstone Quarry to Be Re-opened

OPERATION of the greenstone quarry in Fort Hill, Lynchburg, Va., which has been idle for several months, is to be resumed, it was announced by C. G. Loving, one of the owners of the property.

Application has been made to the state corporation commission to charter the newly formed Virginia Greenstone Co., which will operate the quarry and a mill located at Twelfth street and Fort avenue. Mr. Loving said the concern had received several large orders recently from the West, and would also furnish much of the stone for use in construction of the new Allied Arts building at Eighth and Church streets.

From eight to ten men will be employed at the quarry as soon as new machinery is installed, and a like number will be placed at work in the mill. Mr. Loving indicated the number of employes might be increased later.—*Lynchburg* (Va.) *Advance.*

New Book on Engineering Achievements in 1930

"THE INDUSTRIAL DEPRESSION of 1930 has not halted the advance of science and engineering, nor the march of those great tendencies which make electrical progress so full of interest," states S. M. Kintner, assistant vice-president of the Westinghouse Electric and Manufacturing Co., in the foreword of a new booklet published by the company entitled "Engineering Achievements—1930."

The booklet is very complete and well illustrated, and affords the reader a clear picture of the outstanding electrical developments of the year.

Of particular interest is the description of the mechanical stokers whch feed coal at the rate of 22 tons per hour, mine hoists which lift 17 ton loads, the development of turbine-generator units of 3600 r.p.m., the 2000-hp. turbine-electric towboats, the strides made in oil-electric locomotive design, and the application of the propeller principle in the design of both pumps for water and blowers for air.

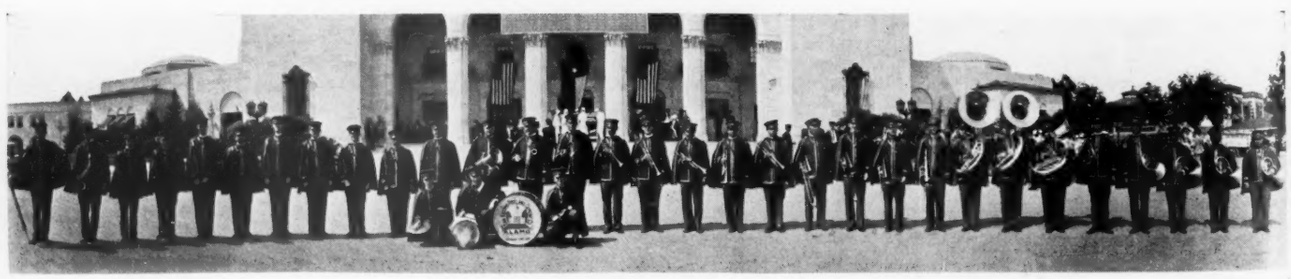
Copies of the booklet may be had by addressing the Westinghouse Electric and Manufacturing Co., East Pittsburgh, Penn.

San Antonio's Cement Co. Has Brass Band

THE San Antonio Portland Cement Co., San Antonio, Texas, has a brass band which is one of the most popular music organizations in that city and the surrounding section of Texas.

The organization is composed entirely of company employes and includes the superintendent, assistant superintendent, several of the department heads and even the office boy. It is known as the Alamo Band, and has been a great factor in maintaining the spirit in the mill.

The management credits it largely with the winning of the Portland Cement Association safety trophy for completing 1930 with accidents.



Alamo Band, made up of employes of the San Antonio Portland Cement Co., San Antonio, Tex.

Can Byproduct Carbon Dioxide Be Used in "Dry-Ice" Manufacture?

With Particular Reference to the Availability of CO_2 Gases from Lime and Cement Kilns

By D. H. Killeffer

DryIce Corporation of America, 52 Vanderbilt Avenue, New York City

WITHIN A PERIOD now slightly more than five years, solid carbon dioxide, under the trademark, "Dry-Ice,"* of the pioneer company in its development, has made a place for itself in the refrigerated transportation of perishables and its production has grown from nothing to many thousands of tons annually. That a new market has been created for carbon dioxide gas to supply the raw material of this new industry is obvious, but various economic factors profoundly affecting the situation are not so evident. It is our purpose here to discuss some of them, particularly as they affect the possible utilization of the huge quantities of carbon dioxide produced by the lime and cement industries.

The present consumption of carbon dioxide by this new industry is important and imposing only when considered without reference to the supply readily available. To get a true picture of the situation it is necessary to weigh the possible sources of the gas as a raw material with relation both to demand and to each other.

Sources of CO_2 Gas

To mention only three possible sources, the alcohol industry produces an amount of carbon dioxide nearly equal to the amount of alcohol it markets, lime kilns release a little more carbon dioxide than their tonnage of lime and every ton of coal burned is converted into about three tons of the gas. Obviously these three sources produce many times more gas than the solid carbon dioxide industry, even grown to the stupendous proportions predicted by enthusiasts, can expect to consume. Obviously, too, this new consuming industry will be able to pick and choose the sources of its raw material and will utilize only such gas as can be most economically provided to it. Also, it is evident that on this basis some of the possible sources will be left waiting for a long time before they are economically useful.

With such a bountiful supply of raw material available to supply the existing demand and with price as an important factor in availability, it seems probable that the value of the gas as a raw material will always bear a close relation to its cost of recovery and purification. Competition among different sources will necessarily prevent more than a very modest profit to the owner of any particular source. At the present time the recovery and purification costs, in addition to economic considerations involved in marketing the finished product, prevent profitable utilization of more than a very few of the possible sources of byproduct gas.

*"Dry-Ice" is the registered trademark of the DryIce Corporation of America.

Introduction

***ONE QUESTION** the editors have been asked more frequently than any other is in regard to the commercial prospects of using CO_2 gas from lime kilns for the manufacture of the refrigerant popularly known as "Dry-Ice."*

Since we have been fairly familiar with the economic considerations involved, as well as being entirely familiar with the lime industry, we have been able to answer such questions intelligently and soundly.

Yet promoters in different parts of the country are continually cropping up with schemes to make millions in the lime business with carbon dioxide as a byproduct.

So we decided to obtain and publish an authoritative statement on the subject. Here it is.

It is not encouraging to lime and cement manufacturers who may have had visions of wealth to be derived from "Dry-Ice" manufacture. Yet it jibes exactly with what we know of the experience of a few lime manufacturers who have experimented.

Conditions, times and processes change. What holds for this industry today, may not, of course, always hold. But, much as we would like to present a happy picture of the market for their waste CO_2 gas to lime and cement manufacturers —and a market for compressors, etc., to our machinery advertisers — instead we present them the truth.—The Editors.

How and Why the Industry Has Developed

With these general considerations before us it will be well to look at the present industry of solid carbon dioxide and its recent rapid development to establish some approximate estimate of its probable future.

The first successful utilization of solid carbon dioxide in commercial refrigeration dates from the introduction of this product in 1925 by the DryIce Corporation of America under its trademark, "Dry-Ice." The primary reason for the success of this venture, when others had previously failed to accomplish the same thing, was in the methods of use invented and patented by Thomas B. Slate, shortly before this time, and later materially amplified and extended to many fields.

Slate was the first to take advantage of the valuable properties of the dry, cold carbon dioxide gas generated during refrigeration by the solid, and upon these as a basis, methods of utilization have been devised to make a single pound of solid carbon dioxide perform the same commercial task previously requiring as much as ten to twenty pounds of water ice, although the theoretical ratio of refrigerating effect of the two would indicate that one pound of solid carbon dioxide would do only the work of two pounds of ice. These revolutionary methods are, of course, covered by patents controlled by the pioneer company in this field.

Changes in Refrigeration Equipment Necessary

To put the new material usefully to work it has been necessary to re-design refrigeration equipment wherever it is applied, and this has meant that much existing ice-using equipment (particularly trucks) has become obsolete. The replacement of this equipment by that required for the utilization of "Dry-Ice" has necessarily been a slow process on account of the new investment required, and for this reason the market for "Dry-Ice" has had to be developed in keeping with the ability of users to put new equipment into service. Even with this handicap the use of the new refrigerant has grown steadily and is continuing to grow as its convenience, safety and economy are more fully demonstrated by wider commercial application.

It is especially pertinent to note here what many overlook: At no time in this original rapid growth has the new industry been hampered in the least by anything resembling a scarcity of supply of raw material. Although in five years the new industry has grown to the point of marketing annually as much carbon dioxide in solid form as is

sold in liquid, the amount of the gas available as a raw material has always been enormously greater than the existing demand. The limiting factors in development to date have been the investment required of the user, the adaptation of methods of use to particular problems and occasionally temporary inability of production to meet sudden peaks of demand.

Process of Manufacture

The process of manufacture of "Dry-Ice" consists of three steps: the purification of carbon dioxide to yield a gas free from foreign odors and of higher than 99% CO_2 content, the compression of this pure gas to form a liquid, and the conversion of the pure liquid to a solid. The first of these steps varies in cost and difficulty depending upon the type of gas supplied.

Liquefaction and solidification are more or less fixed costs after pure gas has been supplied to the process, but both involve relatively high power costs. For the purposes of the present discussion only the first of these steps is important in establishing the value of any particular source of gas.

Deciding Factors in Selection of Source of CO_2

The deciding factors with respect to the utilization of any source of gas are primarily economic and to a less extent technological. The perishable nature of the product requires that it be produced at or near the point and time of use, for unavoidable losses by evaporation of a material at so low a temperature as 109.6 deg. below zero F. rapidly consume possible profits during storage or transportation, and freight costs must be minimized to keep the selling price of the product low enough to make its use economical.

The power consumed in purifying and solidifying the gas is a large proportion of the manufacturing cost and hence a low power cost at the point of manufacture is essential.

Consumers, once having adopted "Dry-Ice" methods, must be assured of absolutely continuous supply, which requires that production capacity must be based on peak demand to avoid too great losses in storage of finished product. By utilizing novel methods, not available to others, the Dry-Ice Corp. has succeeded in partially overcoming the expenses of fluctuating demand by storage of "Dry-Ice."

Technological difficulties in the industry have largely been converted into economic ones as the art has progressed. By that it is not intended to convey the impression that problems no longer exist, but rather that, while there is an available technique for solving the technical problems that may arise, many of them are economically impractical. These techniques, where they represent novel methods (as they usually do), are covered by patents. Improved methods may still be expected in the course of further development, but one is able by the application of methods now in use, or proposed, to solve most problems. Since here we are considering the availability of gas from existing sources, we must note that purification (removal of inert gases and foreign odors from carbon dioxide) is the principal problem and one on which the availability of gas from any particular type of source most largely depends.

In considering this phase of the larger question, ordinary sources of byproduct gas may be divided into three general classes:

(1) Substantially pure gas.

(2) Gas containing substantial amounts of inert impurities, such as nitrogen, air, etc., along with less than 50% of carbon dioxide produced, for example, in the burning of lime.

(3) Combustion gases, containing less than 20% carbon dioxide.

Sources of CO_2 Gas

Fermentation gas, which is already being utilized in the manufacture of "Dry-Ice" in quantity, belongs to the first class. Because the product must be of highest purity for use with food, even this gas must be freed from foreign odors, an operation which is often delicate, before it can be satisfactorily liquefied and solidified. Numerous chemical operations and several types of fermentations yield carbon dioxide usable in this way after the purification necessary to free it from undesired odor. In general, each source of gas requires a special kind of purification. Naturally the raw gas from such operations is more readily available for use than that from sources requiring removal of both odorous and inert constituents.

The second general type of byproduct gas may be typified by combustion gas enriched from other sources. The gas from lime kilns, for instance, contains 30% or more of carbon dioxide mixed with air (oxygen and nitrogen), etc. The removal of these inert gases from carbon dioxide, or more properly the separation of the latter in pure form, involves the expenditure of relatively large amounts of power, and it is only in situations particularly favorable otherwise that this diluted gas can be profitably used. The purified gas handicapped with this high purification cost must compete with the high concentration product of other operations in price and availability, and this places it under a disability which is usually too serious to allow its use.

Attempts to Make Lime by Special Processes

From time to time methods of burning lime have been proposed which have had as their objective the removal of carbon dioxide of high concentration directly from the kiln as a byproduct of the operation. Semi-commercial tests have been made of some of these processes and it has been shown clearly that the increase in value of the gas recovered over other lime-kiln stack gases is too low to carry the added expense of the operation. Manifestly the market for lime will not permit this product to carry additional charges and the carbon dioxide, sought to be recovered in high concentration by additional complications and costs in the process, is not of sufficient value in competition with other sources to allow it to bear this burden profitably alone.

In general it may be concluded that the cost of carbon dioxide purified from gases of this general character and concentration is too high to justify its use at present whether the purification is accomplished by modifying existing processes or by a separate operation.

Power and CO_2 Gas from Coke

Combustion gases necessarily cannot contain more than 21% carbon dioxide, for this is the greatest quantity theoretically producible from the oxygen contained in the air, unless the air used has been enriched with added oxygen. The coke process, which supplies a flue gas containing 18% or so of carbon dioxide, and at the same time supplies power for its purification and compression, is the only present one utilizing combustion gases for the production of pure carbon dioxide. In this process, high grade coke is burned under a special boiler to supply the power required to purify, compress and solidify the gas simultaneously vented from the fire. The power thus available is enough to purify and liquefy less than a third of the carbon dioxide simultaneously produced as the process is now practiced.

It is only because the coke flue gas contains a percentage of carbon dioxide relatively higher than ordinary flue gas, and the entire available power from the furnace is simultaneously utilized, that an unenriched flue gas can be used at all as a source of pure carbon dioxide. The high power requirement of the purification process decreases somewhat as the concentration of gas increases and at 100% it becomes only the cost of odor removal, which is seldom negligible compared even with that of removing inert gases.

Summary

Summing up the situation, the value of the gas as a raw material depends on the ability of the processor to market the final product, in this case solid carbon dioxide, profitably; and upon the relative availability of other competitive sources of gas. The probable value of gas from any type of source rapidly diminishes as its concentration falls below 100% on account of the amount of work necessary to obtain high purity.

Byproduct gases containing 25% or less of carbon dioxide are too plentiful, and too expensive to purify, to allow them any market value as sources of carbon dioxide. Higher concentrations must be able to com-

pete in cost of purification plus original value (if any) with gas of 100% concentration until such a time as all equally available sources of high concentration gas have been utilized.

It does not now seem probable that processing of lime kiln flue gas (containing less than 40% CO_2) for its carbon dioxide content will be profitable for many years to come, or until the demand for pure carbon dioxide has grown to many times its present amount. Because of the highly specialized technique and the governing economic factors involved, it will probably always be more profitable to the producer of byproduct gas to offer it to the recognized producer of solid carbon dioxide than to embark upon the manufacture of this peculiar product so foreign to his own specialties.

Supreme Court Decision on Solid Carbon Dioxide

IN A DECISION rendered March 9, 1931, by Justice Brandeis of the United States supreme court in the case of the Carbice Corp. of America vs. American Patents Development Corp., et al., on writ of certiorari to the circuit court of appeals for the second circuit, the decision of the court of appeals was reversed. By this decision the owner of a patent is denied the right to restrict unpatented adjuncts, the court holding that the licensor cannot impose such conditions in licensing the use of a package employing solid carbon dioxide. Excerpts from the decision follow:

The American Patents Development Corp., as owner of United States Patent No. 1,595,426, and the DryIce Corp. as exclusive licensee brought this suit in the Federal court for eastern New York to enjoin contributory infringement by the Carbice Co., for an accounting of profits, and for damages. The defendant denied both the validity of the patent and the alleged infringement. The district court, without passing upon validity, dismissed the bill on the ground that infringement had not been shown. The circuit court of appeals held the patent valid and infringed. A writ of certiorari was granted. . . .

The patent in suit is not for solid carbon dioxide. That article and its properties as a refrigerant have been long known to the public. The patent is not for a machine for making solid carbon dioxide. Nor is it for a process for making or using that substance. The Patent Office rejected an application for a process patent. The patent is said to be for a manufacture. The specifications outline the method of construction and use; and a typical claim (6) is for a "transportation package consisting of a protective casing of insulating material having packed therein a quantity of frozen carbon dioxide in an insulating container and a quantity of freezable product in freezing proximity to said frozen carbon dioxide and the gas evaporated therefrom, arranged so that said frozen carbon dioxide is less accessible for exterior heat than said freezable products." . . .

The sole business of the DryIce Corp. is the manufacture of solid carbon dioxide, which it sells under the name of "DryIce." It does not make or sell transportation packages in which solid carbon dioxide is used as a refrigerant. It does not issue to other concerns licenses to make such packages upon payment of a stipulated royalty. . . .

The Carbice Corp. also manufactures solid carbon dioxide. It is charged with contributory infringement because it sells its product to customers of the DryIce Corp. with knowledge that the dioxide is to be used by the purchaser in transportation packages like those described in the patent. The Carbice Corp. challenges the validity of the patent and denies infringement. Whether the transportation package described is a patentable invention we need not determine. For even if it is, no relief can be granted. . . .

The invention claimed is for a particular kind of package employing solid carbon dioxide in a new combination. If the patent is valid, the owner can, of course, prohibit entirely the manufacture, sale, or use of such packages. Or it can grant licenses upon terms consistent with the limited scope of the patent monopoly. It may charge a royalty or license fee. But it may not exact as the condition of a license that unpatented materials used in connection with the invention shall be purchased only from the licensor; and if it does so, relief against one who supplies such unpatented materials will be denied. The limited monopoly to make, use, and vend an article may not be "expanded by limitations as to materials and supplies necessary to the operation of it." . . .

If a monopoly could be so expanded, the owner of a patent for a product might conceivably monopolize the commerce in a large part of unpatented materials used in its manufacture. The owner of a patent for a process might secure a partial monopoly on the unpatented material employed in it. The owner of the patent in suit might conceivably secure a limited monopoly for the supply not only of solid carbon dioxide, but also of the ice cream and other foods, as well as of the cartons in which they are shipped. The attempt to limit the license to the use of unpatented materials purchased from the licensor is comparable to the attempt of a patentee to fix the price at which the patented article may be resold.

The DryIce Corp. has no right to be free from competition in the sale of solid carbon dioxide. Control over the supply of such unpatented material is beyond the scope of the patentee's monopoly; and this limitation, inherent in the patent grant, is not dependent upon the peculiar function or character of the unpatented material or on the way in which it is used. Relief is denied because the DryIce Corp. is attempting, without sanction of law, to employ the patent to secure a limited monopoly of unpatented material used in applying the invention. The present attempt is analogous to the use of a patent as an instrument for restraining commerce which was condemned, under the Sherman anti-trust law.—*Industrial and Engineering Chemistry.*

Cement Syndicate in Rumania

A SYNDICATE has been organized by the cement producers of Rumania which will exercise control over production through allotment quotas as well as sales, although not the entire industry is included in the new organization.

Approximately 40% of the Rumania cement production annually is represented in the agreement, according to estimates.—*New York* (N. Y.) *Journal of Commerce.*

Sand-Lime Brick Production and Shipments in February

THE following data are compiled from reports received direct from 20 producers of sand-lime brick located in various parts of the United States and Canada. The number of plants reporting is one less than those furnishing statistics for the January estimate, published in the February 28 issue. The statistics below may be regarded as representative of the entire industry in the United States and Canada.

Reports for the month of February indicate that production has increased somewhat, as have rail and truck shipments. An increase is also shown in stocks on hand and unfilled orders.

Average Prices for February

Shipping point	Plant price	Delivered
Atlantic City, N. J.	$10.00	$15.00
Detroit, Mich.	13.00	15.50
Detroit, Mich.	.....	15.50
Detroit, Mich.	13.00	14.50
Grand Rapids, Mich.	.....	14.00
Iona, N. J.	11.00	14.00
Jackson, Mich.	13.00	.....
Menominee, Mich.	11.00	13.50
Milwaukee, Wis.	9.50	12.00
Minneapolis, Minn.	9.00	.....
Mishawaka, Ind.	11.00	.....
Pontiac, Mich.	11.00	13.00
Saginaw, Mich.	12.00	.....
Sioux Falls, S. Dak.	12.00	.....
Syracuse, N. Y.	14.00	18.00
Toronto, Can.	10.90	13.00
Winchester, Mass.	.....	12.00

The following statistics are compiled from data received direct from 20 producers:

Statistics for January and February

	*January	†February
Production	3,718,025	4,139,670
Shipments (rail)	910,377	1,492,938
Shipments (truck)	3,366,634	3,306,038
Stocks	11,593,938	11,711,433
Unfilled orders	5,245,000	6,420,000

*Twenty-one plants reporting. Incomplete, one not reporting production and seven not reporting unfilled orders.

†Twenty plants reporting. Incomplete, one not reporting production and eight not reporting unfilled orders.

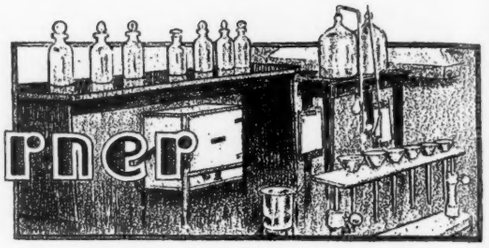
Notes from Producers

Sioux Falls Pressed Brick Co., Sioux Falls, S. Dak., reports that it is supplying sand-lime brick for enlarging and improving the City Coliseum, and is furnishing brick to the city water and sewer departments for the construction of manholes.

A very attractive folder outlining the advantages and uses of Rock-O-Lite sand-lime brick is being circulated by the Sand Lime Products Co., Detroit, Mich. This company advises that it is supplying Rock-O-Lite sand-lime brick for several Detroit city schools.

A mailing piece calling attention to the advantages of sand-lime brick for building construction is being sent out by the Saginaw Brick Co., Saginaw, Mich. The circular shows a very convincing illustration in the Bank of Saginaw structure for which the company supplied over 600,000 sand-lime brick.

The Chemists' Corner



Free Lime in Portland Cement Clinker and Soundness of Cement

By Katsuzo Koyanagi
Tokyo, Japan

THE PROBLEM OF FREE LIME in cement as an origin of unsoundness has long been hotly discussed among the cement scientists. There have been two opinions on this subject, one of which was expounded by Rohland*, who imagines that the lime is dissolved in other constituents of cement by burning, and the cement becomes unsound only when a part of lime is neither dissolved nor chemically combined. The other opinion is represented by H. Kuehl†, who denies obstinately the existence of free lime in cement, and says that portland cement, even an unsound one, contains no free lime, and unsoundness of portland cement is caused by the existence of so-called "explosive grains," i. e., the substance consists of lime and other constituents of cement, which contains excess lime, chemically combined or in solid solution. This discussion has not yet been ended, and remains as one of the most difficult subjects unsolved in the cement industry.

We run a risk in touching this difficult problem, because the glycerin method of free lime determination, discovery of which we owe to the American chemist Warren E. Emley‡, seems to be very reasonable and reliable.

All determination of free lime in my experiments reported below have been carried out with Emley's method modified by Rathke.¶

Experiment No. 1. Degree of Burning of Portland Cement Clinker and Free Lime

There prevails among cement burners in Japan such a primitive method as determining the clinker quality by lapping. They believe that if the clinker absorbs the saliva quickly, it is not good in quality; on the contrary, if the saliva remains a longer time on the surface of the clinker, then it must be good in quality. I have been interested in this primitive method and have tried to improve upon it in a little more scientific form.

In the nature of clinker sucking up saliva, the capillary action of small holes in the clinker plays the principal part. The more porous the clinker the quicker it will suck up the liquid. For this reason I tried to determine the porosity of clinker and compare it with free lime content and soundness of cement.

The formula for determination of porosity is as follows:

$$P = \frac{Ww - Wd}{Ww - Ws} \times 100$$

in which:

P = Porosity in %.
Wd = Weight of dry material.
Ww = Weight of the material after being immersed in water for 24 hours.
Ws = Ww weighed in suspended state in water (or its equivalent).

This formula can be applied only in determination of the porosity of a substance that does not react with water, so we used, instead of water, turpentine oil free from water, in our experiment, and Ww was so obtained that we immersed the clinker in oil 24 hours, boiled half an hour, cooled and then weighed. From one sample of clinker we took 10 pieces of size 15 to 20 mm., determined the porosity by the above method, and took the mean value of them.

TESTING METHODS FOR SOUNDNESS: We carried out 3 tests.

(1) Water-test.
(2) Boiling-test.
(3) LeChatelier's test (modified).

The first two tests were carried out as usual, the last one was put in practice as follows:

LeChatelier's test (modified): The LeChatelier calipers were placed on a glass plate, filled with neat cement of normal consistency, covered with another glass plate, and kept at 20 deg. C. for 3 or 4 hours. The distance between two needle tips was now measured with a micrometer. The apparatus was then put into a drying oven, kept at 30 deg. to 40 deg. C. for 4 hr., then immersed quickly in boiling water and boiled for twenty minutes. The calipers were taken out of the water, and again the distance of needle tips measured. The difference of the two measurements in millimeters gives the soundness of the cement. We have used this method a long time in our laboratory and found it very reliable. The cement which gives an expansion under 3 mm. is completely sound both in water- and boiling-test, and cement with expansion over 4 mm., is more or less unsound in the boiling-test. Some of the cements, which show very large expansion (over 30 mm.) are unsound also in the water-test.

We took many samples of about the same chemical composition, and cooled them without water sprinkling, tested them for porosity, free lime, soundness, setting time, specific gravity and strength. Table 1 shows the results of these tests.

We can see in this table that there is some relation between free lime and degree of burning and soundness of cement. With the increase in porosity, content in free lime increases, and the soundness of the cement decreases.

After experimenting with many sorts of clinker of various chemical compositions, we found some exceptions with regard to the connection between porosity of clinker and cement soundness. There are certain clinkers, which show quite low porosity, notwithstanding they contain much free lime and the cements made of these clinkers are unsound. For example:

	Clinker		
	No. 1	No. 2	No. 3
Loss on ignition	1.15	0.89	0.59
Chemical composition			
SiO_2	16.50	21.34	28.05
Al_2O_3	9.68	5.36	7.76
Fe_2O_3	7.46	4.06	2.13
CaO	64.26	66.51	58.85
MgO	1.43	1.00	1.06
Porosity, %	10.52	15.30	7.39
Free lime, %	1.75	1.25	0.90
Cement soundness			
Boiling-test	(*)	(*)	(†)
Water-test	(‡)	(‡)	(‡)

*Incomplete. †Complete, but soft pat. ‡Complete.

Clinkers No. 1 and No. 2 were very hard burned clinkers, containing much iron oxide.

*Rohland: Der Portlandzement vom physikalisch-chemischen Stand-Pt.
†Hans Kuehl: Der freier Kalk im Portlandzement, *Zement*, 1925, Nr. 25.
‡Warren E. Emley: Transactions of the Am. Cer. Soc., 1915.
¶Rathke: *Tonindustrie Ztg.*, 1928, Nr. 65.

TABLE 1

Type of clinker	Porosity of clinker %	Free CaO %	Fineness of cem. 4900/ cm.²	Fineness of cem. 10,000/ cm.²	Sp.gr. of cement	Soundess of cement: Boiling test	Soundess of cement: Water test 28 days	Soundess of cement: Le Chatelier	Setting time: Begin hr.	Setting time: End hr.	Tensile strength (1:3): 3 days	Tensile strength (1:3): 7 days	Tensile strength (1:3): 28 days	Comp. strength (1:3): 3 days	Comp. strength (1:3): 7 days	Comp. strength (1:3): 28 days
C_1	13.48	0.31	4.0	13.0	3.16	Complete	Complete	0.0 mm.	4.00	6.10	29.1	39.5	41.8	283.0	457.0	552.0
C_2	13.81	0.23	4.0	13.2	3.16	Complete	Complete	0.0 mm.	4.00	6.00	.....	37.0	38.0	.....	446.0	536.0
C_3	14.00	0.27	4.0	13.2	3.16	Complete	Complete	0.0 mm.	4.00	5.25	32.0	33.3	41.6	339.6	479.3	579.3
C_4	15.74	0.51	4.0	13.6	3.14	Complete	Complete	0.8 mm.	3.50	5.05	25.6	26.8	32.5	263.3	324.0	492.5
C_5	21.12	0.65	4.0	14.0	3.13	Complete	Complete	1.2 mm.	3.40	5.40	29.0	29.6	34.0	324.6	428.6	501.3
C_6	24.18	1.15	4.0	13.4	3.13	Soft, volume expansion and bending	Complete	10.6 mm.	2.50	3.51	.....	25.3	30.5	.....	392.0	504.0
C_7	28.04	1.21	4.0	13.4	3.11	Soft, expansion, bending and net cracks	Complete, but glass plate cracks	20.7 mm.	2.06	3.06	22.7	21.8	33.8	344.0	375.3	511.0
C_8	28.43	1.87	3.0	12.2	3.13	Soft, expansion, bending and net cracks	Complete, but glass plate cracks	24.8 mm.	2.36	3.35	22.6	23.1	32.3	369.5	460.6	472.3
C_9	30.19	1.93	4.0	13.5	3.14	Soft, expansion, bending and net cracks	Complete, but glass plate cracks	34.0 mm.	2.30	3.43	21.6	21.8	27.0	322.6	415.3	478.6
C_{10}	32.21	2.40	4.0	13.6	3.16	Broke down partly	Net and edge cracks	44.7 mm.	2.15	3.29	18.1	22.1	31.1	308.0	343.0	416.6
C_{11}	33.53	2.44	4.0	13.4	3.16	Broke down partly	Net and edge cracks	49.8 mm.	2.35	3.50	19.0	20.8	24.8	315.3	402.0	421.6
C_{12}	50.09	5.69	4.0	13.8	3.16	Broke down completely	After 3 days many cracks	52.2 mm.	1.52	2.58	Broke down after three days; impossible to determine the strength					

No. 3 was an over-burned one with an extraordinarily low lime content.

Experiment No. 2. Mixing the Unsound Cement and a Sound One

We prepared some samples of cement by mixing an unsound cement with a sound one. The content of free lime in both original cements was first determined and the free lime content in the mixed cements was obtained by calculation. We ground both clinkers separately in a laboratory disintegrator, mixed them in required proportion, added the same amount of gypsum, then ground in a test mill. The fineness of the cements was kept nearly the same for all samples.

The cements were tested for soundness, and compared with the calculated free lime contents. Table 2 shows the results.

We see from the results of these tests that the cement becomes unsound in the boiling-test when the calculated content of free lime amounts to 0.99% CaO, and with higher contents of free lime, the soundness of the cement decreases.

Experiment No. 3. Decrease in Content of the Free Lime, and Increase in Soundness, During the Storage of the Cement

It is a well known fact that cement which is unsound just after grinding, can be made sound by storing for some time. It is generally believed that the free lime, which is contained in cement and makes it unsound, is changed by the action of moisture and carbon dioxide in the air, during the storage, into calcium carbonate, and so the cement becomes sound. In order to check this belief we carried out some experiments.

A cement which did not pass satisfactorily the water and boiling tests and had a free lime content of 2.44%, was spread on paper in the laboratory room, and stored there for 40 days. Now and then a sample was taken from this cement and tested for free lime and soundness. The temperature in the storage room ranged from 23 deg. C. to 30 deg. C., and atmospheric moisture amounted to 80-100% normal.

Table 3 shows the results of this experiment.

We see in this table that the free lime content of cement decreased in 20 days of storage from 2.44% to 0.80% CaO, and the cement became then completely sound.

TABLE 2

Mixing proportion: Sound cement	Mixing proportion: Unsound cement	Fineness of cements: 4900 /cm.²	Fineness of cements: 10,000 /cm.²	Setting time: Begin hrs.	Setting time: End hrs.	Free lime CaO, %	Soundness of cements: LeChatelier in mm.	Soundness of cements: Boiling test	Soundness of cements: Water test
100	0	4.0	13.2	3.57	5.20	Determined 0.27	0	Complete	Complete
0	100	4.0	13.4	2.57	4.52	Determined 2.06	38.30	Soft, expansion and bending, cracks	Complete
90	10	4.0	13.2	3.25	5.10	Calculated 0.45	1.80	Complete	Complete
80	20	4.0	13.4	3.20	5.05	Calculated 0.63	1.40	Complete	Complete
70	30	4.0	13.6	3.20	5.00	Calculated 0.81	1.65	Complete	Complete
60	40	4.0	13.4	3.30	5.12	Calculated 0.99	5.05	Hard, but a little bending outwards	Complete
50	50	3.8	13.2	3.22	5.00	Calculated 1.17	5.75	Bending outwards, edge-cracks	Complete
40	60	4.0	13.4	3.23	5.05	Calculated 1.35	18.60	Bending inwards, edge-cracks	Complete
30	70	3.8	13.2	3.32	5.10	Calculated 1.52	21.15	Soft, bending, expansion and net cracks	Complete
20	80	4.0	13.6	3.30	5.10	Calculated 1.70	28.55	Same as above	Complete
10	90	4.0	13.4	3.30	5.05	Calculated 1.88	32.75	Same as above	Complete

TABLE 3

Storage time in days	Fineness: 4900 /cm.²	Fineness: 10,000 /cm.²	Setting time: Begin	Setting time: End	Loss on ignition, %	Free CaO %	Le Chatelier mm.	Soundness of cement: Boiling test	Soundness of cement: Water test
Original cement	4.0	13.4	3.25	4.40	1.20	2.44	49.8	Broke down	Net cracks
3 days	4.0	13.4	4.00	6.00	2.15	1.49	11.4	Soft, bending, expansion and net cracks	Complete. Cracks on glass plate
5 days	4.0	13.4	4.30	6.33	2.45	1.35	6.4	Same as above	Same as above
10 days	4.0	13.4	4.30	6.00	3.73	1.20	5.7	Same as above	Same as above
20 days	4.0	13.4	4.45	6.58	5.35	0.80	1.5	Complete	Complete
30 days	4.0	13.4	5.36	7.00	6.87	0.33	0.0	Complete	Complete
40 days	4.0	13.4	7.37	10.25	8.07	0.30	0.0	Complete	Complete

Summary

The results of all experiments can be summed up as follows:

All unsound cements contain free lime in no small quantity, though the well burnt sound cements contain very little of it.

At a fineness of cement of about 4% residue on a 4900-mesh (metric) sieve, when the content of free lime goes over about 1%, the cement becomes unsound in the boiling test. When this exceeds about 2.2%, the cement becomes unsound in boiling- and water-tests.

Whether the free lime in cement, determined by glycerin method, exists there absolutely in free state or as a so-called "explosive grain," is not known exactly, but it seems to be certain that this lime affects the soundness of cement very much.

Crushed Oyster Shells Being Exported from Texas

AN EXPORT MARKET of considerable magnitude may be developed for the millions of tons of oyster shells that are found in shell banks along the Gulf Coast of Texas, as indicated by the recent shipment to Antwerp through the port of Houston of 500 bags of the crushed shells, according to information received by the State Game, Fish and Oyster Commission. The shell banks are in Texas waters and are owned by the state. The shells are already used extensively in highway construction in the Gulf Coast region, their cement contents serving to bind the road materials. At Houston there is also a large cement manufacturing plant and a lime plant which use material from these shell banks for the making of a high grade cement and lime. The large deposits of shells along the coast are supposed to have been placed there by high tides and strong winds.

Hints and Helps for Superintendents

Manganese Wearing Pieces on Dipper Excavating Overburden

By C. H. Wright
Snyder, N. Y.

REFERRING to the pictures of the two dippers made exclusively for excavating in earth, which are (rather, are to be) used in stripping overburden, we assume that the dipper must be as flat as possible across the front or the mouth piece, and the teeth should be in very near a straight line, so that when the earth is removed from the rock, it will be done without much nibbling or man power with pick and shovel.

First looking at Fig. 1 we find it in very poor condition. The shell of the dipper is completely worn out, the lower strap which forms a wearing piece around the bottom of the dipper is also worn out and is broken in three or four places. Where the latch fastens on to the dipper this portion of the shell plate is so badly worn that it is almost impossible to fasten latch plate to the dipper unless large washers or a plate is used opposite the catch plate to support the rivets or the heads of bolts, whichever is used. Also the mouth piece is broken in two places under the teeth bodies.

Looking at the dipper in Fig. 2, this is being used in stripping rock covered with 2 to 3 ft. of earth, and has seen just as much service as the one shown in Fig. 1; indeed I believe I can say frankly that it has really done more hard work, for it has worked longer excavating in rock, where it was necessary to clean up the quarry bottom after the large shovels had taken three or four cuts, cleaning up the stone that had fallen from the cars.

After being in service over fourteen actual working months it shows but very little wear, due to the fact that before the dipper was put into service the two manganese-steel wearing strips were riveted to the shell of the dipper.

What advantage and what benefit do these pieces really have? This will be answered as briefly as possible.

First, the most important consideration in shovel operation is to get the move dug out as quickly as possible, and move up again. If a shovel keeps moving steadily, although it travels very slowly, in the course of a day of ten hours, it is surprising how much space is covered with very little excavating.

These manganese-steel pieces do just these two little things: The face of the dipper being practically straight, taking into consideration the alignment of the teeth, the manganese-steel pieces form such an even surface, that after the move has been dug out, the operator uses the dipper as a sweep by letting the dipper hang in such a way

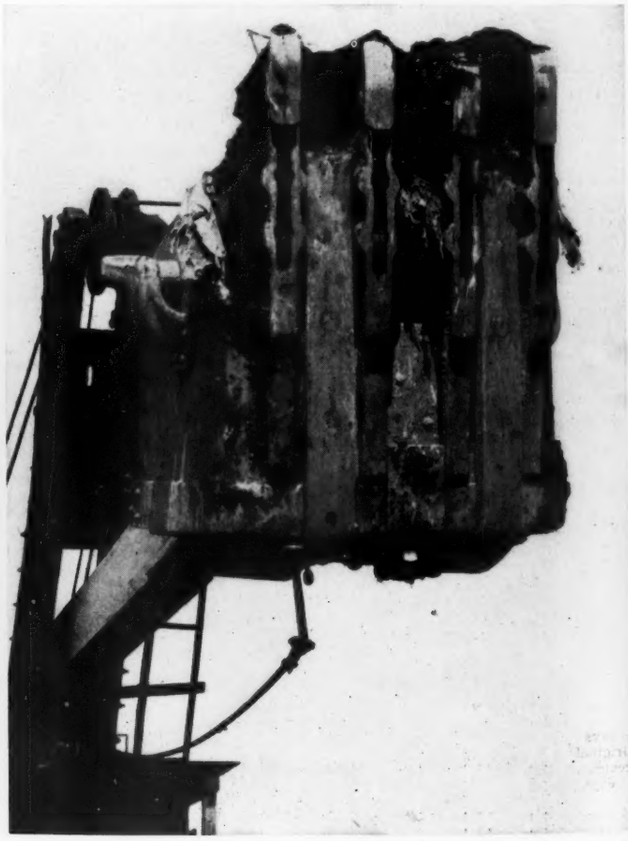


Fig. 1, at left, shows unreinforced dipper worn out. Fig. 2, at right, is a dipper after 14 months in harder service, but having manganese wearing pieces

that the face of the dipper will just about touch the rock, then he swings the dipper over the rock bottom, taking the overburden almost as clean as a man can take it with a small hand shovel, so not much time is lost in cleaning up for the next move.

But the most important point of these manganese-steel pieces is that they more than double the life of the dipper, for they take nearly all the wear of the dipper in general. After the teeth leave the bottom and have done their part then the manganese-steel takes the rest of the wear. No time is lost in repairing this dipper; this means a larger output at the end of each working day.

Also with these manganese-steel pieces the teeth bodies do not wear out nearly so fast as without them. The rivets that hold the teeth to the dipper shell do not loosen as the material cannot come in direct contact with the counter-sunk head of the rivet. This is of very great importance in the steady operation of the shovel.

By this simple device it means that the company is not paying out money for repairs and spare parts, and it means steadier working conditions.

Note the little manganese-steel plate riveted on the outside of the bucket opposite the catch plate. This is a large help for it saves the shell of the dipper at this particular point and also saves the rivets from wearing off because the holes in the little plate are counter-sunk very deep. By the time the plate is worn out the latch plate is very tight. When this manganese plate is worn out we always have another to rivet on in its place.

Water at the Grizzly

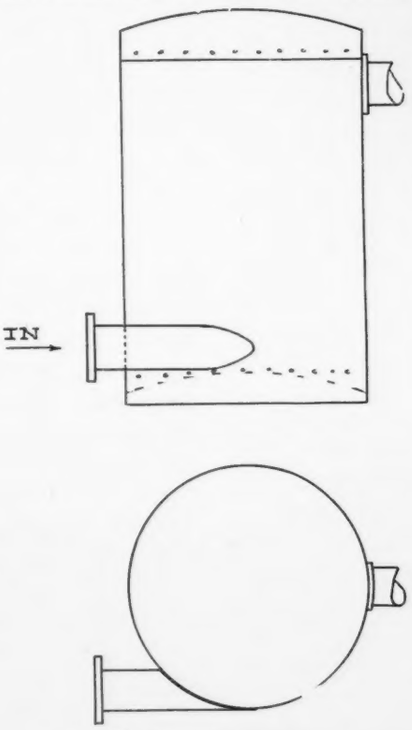
AT THE Highland Park Sand Co. plant near Richmond, Va., the sand is dumped to a bar grizzly and water directed to the different piles by a "T" at the head of the pipe line to which are fitted four water outlets that are nothing more nor less than elbows and tees with restricted openings. All of the pipe joints are loose so that if the operator wishes to change the direction of any of the improvised nozzles, he does so by simply turning them with his hand or with a shovel point.

Easily regulated improvised nozzle

Noise Elimination on an Air Receiver

By V. K. Newcomer
Missouri Portland Cement Co.,
Independence, Mo.

AS ORIGINALLY INSTALLED our two 3000-c.f.m. air compressors are located on the surface in the plant, while the air is used in the mine, being pumped through an 8-in. line. There was no receiver in the compressor room, the receivers being located in various places underground. The result was excessive hammer in the line; and the usual "bom-bom-bom" common to receivers was magnified a considerable number of times, being audible all over the mine. In addition to this we were troubled with water and oil in the line, although we have filters on the compressors.



Noiseless air receiver

We decided to install a receiver in the compressor room and figured that if we put the air in at the bottom tangentially we could separate out the water and oil by centrifugal force and by means of a trap remove both. We built the receiver as shown in the illustration, and found that not only did it remove practically all the oil and water but, to our amazement, the familiar "bom-bom" was entirely eliminated, the receiver being absolutely silent with both compressors running, and the line, too, absolutely silent.

Safety Hats

THE JOHN T. DYER QUARRY CO. at its Monocacy, Penn., quarry is sinking a shaft from which laterals are to be driven so as to provide powder pockets for coyote shooting.

"Tin hats" in commercial service

The men while working in this narrow shaft are protected from falling rock by the trench helmets shown in the accompanying illustration.

Concrete Pipe Dolly

THE WESTERN CONCRETE PIPE CO. has operations scattered from Texas to the Pacific Coast, the largest operation being in Los Angeles, Calif.

The various sized pipe are made on Hume centrifugal pipe machines, and after steam curing are transferred to the curing yard by a gasoline locomotive running on industrial tracks. Very often it is necessary to move large diameter pipe from the yard to points that cannot be reached by the industrial track so a simple dolly of the type shown in the illustration is used. The entire construction is of wood with a handle at each end. A single flat, wood roll is under each end of the wood bed.

Home-made dolly for handling concrete pipe

Editorial Comment

OUR PLATFORM

¶ Greater Economy of Production; the Best in Machinery, Control Equipment; High Wages; Perfect Co-ordination. ¶ Comprehensive Organization of Industry for Research, Promotion. ¶ Retirement of the State from Competition with Private Business. ¶ Active Participation of Business Men in the Business of Government. ¶ The Promotion of Safety and Welfare of the Industry's Employes.

For a National Conference on Public Works Policies

Forty-five states will spend more than a billion dollars for public works construction in 1931. The United States Government will spend many millions more. Much of this construction work was undertaken specifically to help out the unemployment situation and as an aid in restoring normal business conditions. This tremendous sum will be spent for construction labor, supervision and for construction materials. Public authorities are unanimous in recognizing the necessity of spending money for wages of construction labor. Laws have been passed to maintain present wage scales. But apparently no public authority is ready to recognize the equal importance of maintaining commodity prices. Yet all economists agree that a large part of our present troubles is due to the rapid and continuous decline in commodity prices.

A typical example of governmental reasoning is that of the District of Columbia engineering department in its controversy with local sand and gravel producers. It seems there have been several years of cut-throat competition in the sand and gravel industry in Washington, D. C., with abnormally low prices. Recently competitors have eliminated this kind of price warfare by the only legitimate means at their disposal—by mergers—and as a result prices have been advanced 30c. per ton. The engineer commissioner of the District threatens to put the United States Government into the sand and gravel industry rather than pay the increase. He is quoted that "he wants all the money he can possibly get for the employment of labor."

Another example is the case of the highway departments of Wisconsin and Illinois, where bids for several million barrels of cement have been asked for, rejected; and the present demoralized condition of the cement industry has been taken advantage of to obtain new bids on a still lower basis. The performance has been repeated until it is reported that cement manufacturers are bidding against one another on a dollar per barrel mill basis. And these highway officials are congratulating themselves in the public press on the great savings they are making. More than that, in numerous states public-owned and convict-operated cement plants are being agitated as possibilities for greater so-called savings.

It is very difficult for a business man to get these government officials' point of view. The margin between cost of production and selling price is not salted down in the producers' socks—obviously. It is spent to buy new and more up-to-date and efficient machinery and equipment; and perchance, if there are any dividends or profits, these most assuredly are not put in savings banks, as are the laborer's surplus, but into new homes, automobiles, radios, etc.; or they are used to help finance necessary changes and improvements in other industries through the purchase of investment securities. In other words all such margin between cost and price is immediately put to work to pay labor in a thousand-and-one industries. The construction laborer is not the only one to be looked after and paid. In fact President Hoover's chief argument in promoting more public works construction was the leaven this would be in raising all industrial activity.

Obviously the President's Emergency Committee for Employment has not done its work properly unless it provides some protection to the employes of construction material producers as well as to construction laborers. Everyone familiar with the cement industry knows that cement cannot be sold profitably for $1 per bbl. If such prices stick, wholesale wage reductions in cement mills are inevitable. And what consistency is there in providing construction jobs for the jobless at a guaranteed minimum wage of 45c. or 50c. per hour, while at the same time forcing producers to cut wages of their employes to perhaps half that? Or throwing law-abiding citizens out of their jobs to let convicts make cement. Good public policy?

The truth is both producers and public officials are floundering around in the dark, each lacking understanding of, or sympathy for, the other's point of view. We think, because of the tremendous economic importance this year of public works construction, that it is high time for a better mutual understanding. To accomplish this we suggest a national conference, to be presided over by an outstanding public-spirited citizen—say former President Coolidge—and to be attended by two accredited delegates from each construction materials industry, and two accredited delegates from each state highway department, and other public-works construction authorities.

Let the chairman be assisted by an outstanding industrial engineer and an outstanding legal or judicial light, to consult with and advise him. Let the delegates be spokesmen—and good eloquent ones—for their respective industries, or professions; and finally let the conference draw up a code of principles which will govern the conduct and acts of each side of the controversy in its dealings with the other. We do not mean by this that they are to fix prices. But they should draw up a set of rules of public policy under which equitable prices may be arrived at.

For example, is it desirable to maintain wage scales in industry, as well as in construction? Is it good policy for producers to jump the price 30c. per ton for gravel, even though apparently justified by prices elsewhere; shouldn't they have been satisfied under the conditions with a 15c. raise? Is it fair for state highway authorities to promote cut-throat competition by the rejection of bids made in entire good faith, by divulging the low bid and bidder to his competitors and asking them to cut this price, or even giving them an opportunity to? What constitutes a fair price?

The last seems a simple question, but there are diametrically opposite views regarding its answer. Most producers would say it is the cost of production plus a fair margin of profit. But an economist says it is "a price which will insure sales and stimulate consumption of goods." In the case of cement and aggregates where two or three purchasers may take 50% or more of a plant's output, it is obvious there is no free play of so-called economic forces. The price becomes an arbitrary one. The producers are at a great disadvantage whenever there is surplus capacity; their only defense against the tactics of buyers who would set their own price is the illegal one of a private agreement, or the legal one of a merger of the competing mills. Public officials should be capable of comprehending that a safe and sane policy is not to drive producers to either extreme.

We believe we have suggested a feasible solution. We do not approve of talk fests. Therefore we would cut the conference down to a minimum of delegates. Let them present their cases as they would to a court. Let their briefs and arguments be culled for a groundwork of fundamental principles. Let the principles be drawn up in the briefest and simplest terms. And last, let this set of principles be a guide to their business relations, and an outline of a sound public policy.

Aside from a set of principles which should be helpful in straightening out controversial developments in the future, we believe much good would come from the discussions at the conference, provided these were a free airing of the honest convictions of both sides of the controversy.

Diversion of Gasoline Highway Tax

The legislature of the state of Oklahoma has added 1 c. to the tax on gasoline (increasing it from 4 to 5 c. per gal.) to obtain funds (estimated at $3,000,000) for free school books. Highway building has been hailed far and wide in this country as an aid to education, but it is obviously not fair to use road taxes as a carry-all for the expenses of the public schools. Probably Oklahoma is not the first state to so divert highway funds, but it is a flagrant case. Elsewhere a part of the gas tax is sometimes returned to the counties, ostensibly for use on road improvement, but surreptitiously used for other purposes.

All interested in a continuance of highway construction should fight such diversions of the road tax, not merely because the money is needed for roads, but because short-sighted law-makers will soon kill the goose that lays the golden eggs. A sales tax is easy to collect, but one of the easiest to recognize as a dispensable burden; and as soon as the gas tax becomes a burden, people interested in good roads, either as builders, or users, are going to be out of luck. Just now, because the price of gasoline is abnormally low, the constantly increasing tax is not, apparently, burdensome.

Moreover, quarry and gravel pit operators who use gasoline-engine driven equipment often have a direct interest in every increase in the gasoline tax, for in some states gasoline for such industrial use pays the tax, which as it mounts higher and higher may become a real factor in the production cost of cement, lime, stone or gravel.

Legal Limitation of Competition

Elsewhere in this issue Edmund Shaw reports the interesting case of a would-be sand and gravel producer in Los Angeles, who is fighting a local ordinance forbidding him, under the circumstances, building another surplus plant. Mr. Shaw, of large heart and generous disposition, can't help sympathizing with the applicant; yet his common sense, intimate knowledge of the industry and judgment tell him the permit should be refused in the interests of public safety (that is broadly public welfare).

Here we are face to face with an actual case of the possible application of community police or public safety powers to prohibit a citizen the free employment of his property and business talents as he sees fit—a body blow at idealistic American individualism. Yet most of us must agree with Mr. Shaw that genuine public interest is promoted by refusing a permit.

In a private letter, Mr. Shaw, truly says: "We can see what may come of the effect of unrestrained competition in restaurants, beauty parlors, shoe-repair shops and such. Racketeering, bombing and murder keep out newcomers and 'regulate' those who will not play with the crowd. Fortunately bigger business has found a way to regulate by mergers and control of finance." Eventually, even for big business, perhaps, we must choose between the lawful and the extra-legal methods. We already have in our tariff and immigration laws examples of restrictive legislation to curb the would-be free business activities of groups of business men for reasons deemed necessary in the interests of public safety or public welfare.

As our complex industrial situation is better understood, we feel sure that we must make some sacrifice of "inherent rights" as freebooters in business in the interests of society and of the community. We must eventually permit some qualification of our "rights" to waste our own or other people's money in unsound projects. We have made many such sacrifices of our civil and private rights (including the 18th amendment) and we must expect to make some of business rights as industry becomes more "civilized."

Financial News and Comment

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

Stock	Date	Bid	Asked	Dividend
Allentown P. C. 1st 6's[27]	3-26-31	88	.....	
Alpha P. C. new com.[2]	3-21-31	15½	16½	25c qu. Apr. 25
Alpha P. C. pfd.[2]	3-21-31	115	120	1.75 qu. Mar. 14
Amalgamated Phosphate Co. 6's 1936[19]	3-23-31	99½	101	
American Aggregates com.[43]	3-25-31	5	10	75c qu. Mar. 1
American Aggr. 6's w.w.[19]	3-23-31	73⅛	75	
American Aggr. 6's ex. w.[19]	3-23-31	71	75	
American Brick Co., sand-lime brick	10- 6-30	4½	.....	25c qu. Feb. 1, '30
American Brick Co. pfd.	3-23-31	58	59½	50c qu. May 1, '30
Am. L. & S. 1st 7's[19]	3-23-31	95	98	
American SilicaCorp. 6½'s[39]	3-25-31	No market		
Arundel Corp. new com.	3-24-31	40	40¼	75c qu. Apr. 1
Beaver P. C. 1st 7's[20]	3-21-31	92	95	
Bessemer L. & C. Cl. A[4]	3-21-31	31	35	75c qu. Feb. 1
Bessemer L. & C. 1st 6½'s[4]	3-21-31	88	90	
Bloomington Limestone 6's[27]	3-26-31	50	52	
Boston S. & G. new com.[37]	3-21-31	12	16	40c qu. Jan. 2
Boston S. & G. new 7% pfd.[37]	3-21-31	42	47	87½c qu. Jan. 2
California Art Tile A	3-20-31	2	5½	43¾c qu. Mar. 31
California Art Tile B[40]	3-21-31	.....	4	20c qu. Mar. 31
Calaveras Cement com.	3-20-31	.....	12	
Calaveras Cement 7% pfd.	3-20-31	70	75	1.75 qu. Apr. 15
Canada Cement com.	3-24-31	17⅛	17⅝	
Canada Cement pfd.	3-24-31	96	97	1.62½ qu. Mar. 31
Canada Cement 5½'s[34]	3-21-31	102¼	.....	
Canada Cr. St. Corp. bonds[34]	3-21-31	89	97	
Certainteed Prod. com.	3-24-31	6¼	6⅜	
Certainteed Prod. pfd.	3-24-31	24	29¾	1.75 qu. Jan. 1
Cleveland Quarries	3-24-31	.....	75	75c qu. 25c ex. Mar. 1
Columbia S. & G. pfd.	3-23-31	94	100	
Consol. Cement 1st 6½'s, A[44]	3-25-31	20	25	
Consol. Cement 6½% notes[27]	3-26-31	30	35	
Consol. Cement pfd.[27]	3-26-31	10	20	
Consol. Oka S. & G. 6½'s[32] (Canada)	3-23-31	99	101	
Consol. Rock Prod. com.[9]	3-19-31	75c	1	
Consol. Rock Prod. pfd.[9]	3-19-31	3½	4	43¾c qu.June 1,'30
Consol. Rock Prod. units	3-21-31	10	11	
Consol. S. & G. pfd. (Can.)	3-24-31	75	79	1.75 qu. Feb. 16
Construction Mat. com.	3-24-31	8⅛	9¼	
Construction Mat. pfd.	3-24-31	27½	28	87½c qu. Feb. 1
Consumers Rock & Gravel, 1st Mtg. 6's, 1948[35]	3-18-31	75	80	
Coosa P. C.1st 6's[37]	3-26-31	45	55	
Coplay Cem. Mfg. 1st 6's[33]	3-21-31	95	.....	
Coplay Cem. Mfg. com.[33]	3-21-31	10	.....	
Coplay Cem.Mfg. pfd.[33]	3-21-31	60	.....	
Dolese & Shepard	3-24-31	50	60	$1 Apr. 1
Dufferin Pav. & Cr. Stone com.	3-24-31	.....	11	
Dufferin Pav. & Cr. Stone pfd.	3-24-31	76¼	.....	1.75 qu. Apr. 1
Edison P. C. com.[22]	3-21-31	50c	.....	
Edison P. C. pfd.[22]	3-21-31	2½	.....	
Federal P. C. 6½'s, 1941[19]	3-23-31	96	100	
Giant P. C. com.[2]	3-21-31	3	8	
Giant P. C. pfd.[2]	3-21-31	23	27	1.75 s.-a. Dec. 15
Gyp. Lime & Alabastine, Ltd.	3-24-31	10	10¼	20c qu. Apr. 1
Hermitage Cement com.[11]	3-23-31	15	20	
Hermitage Cement pfd.[11]	3-23-31	70	80	
Ideal Cement, new com.	3-24-31	46	48	75c qu. Mar. 31
Ideal Cement 5's, 1943[29]	3-23-31	97	100	
Indiana Limestone units[27]	3-26-31	No market		
Indiana Limestone 6's	3-24-31	55	55⅛	
International Cem. com.	3-24-31	53	53½	$1 qu. Mar. 31
International Cem. bonds 5's	3-24-31	99¼	99¾	Semi-ann. int.
Iron City S. & G. bonds 6's[26]	11- 1-30	90	93	
Kelley Is. L. & T. new stock	3-24-31	32½	34½	62½c qu. Apr. 1
Ky. Cons. St. com. V. T. C.[38]	3-23-31	5	8	
Ky. Cons. Stone 6½'s[38]	3-23-31	84	85	
Ky. Cons. Stone com.[38]	3-23-31	5	8	
Ky. Cons. Stone pfd.	3-24-31	75	85	$1.75 qu. Feb. 1
Ky. Rock Asphalt com.[11]	3-23-31	5	7	40c qu. Oct. 1, '30
Ky. Rock Asphalt pfd.[11]	3-23-31	75	80	1.75 qu. Mar. 1
Ky. Rock Asphalt 6½'s[11]	3-23-31	85	90	
Lawrence P. C.[2]	3-21-31	54	59	$1 qu. Mar. 31
Lawrence P. C. 5½'s, 1942[2]	3-21-31	87	.....	
Lehigh P. C.	3-24-31	16	18	25c qu. May 1
Lehigh P. C. pfd.	3-24-31	100⅛	101	1.75 qu. Apr. 1
Louisville Cement[7]	3-23-31	175	225	
Lyman-Richey 1st 6's, 1932[13]	3-23-31	98	100	
Lyman-Richey 1st 6's, 1935[13]	3-23-31	97	99	
Marblehead Lime 6's[14]	3-21-31	No market		
Marbelite Corp. com. (cement products)	3-19-31	25c	.....	
Marbelite Corp. pfd.	3-19-31	2½	.....	50c qu. Oct. 10,'30
Material Service Corp.	3-24-31	18½	20	50c qu. Mar. 1
McCrady-Rodgers 7% pfd.[22]	3-20-31	45	50	87½c qu. Mar. 30
McCrady-Rodgers com.[22]	3-20-31	17	21	75c Jan. 26
Medusa Portland Cement	3-24-31	.....	65¾	75c qu. Apr. 1
Michigan L. & C. com.[6]	3-21-31	50	.....	
Missouri P. C.	3-25-31	27½	28	50c qu. Jan. 31
Monolith Portland Midwest[9]	3-19-31	1¾	2½	
Monolith P. C. com.[9]	3-19-31	3	4	40c s.-a. Jan. 1
Monolith P. C. pfd.[9]	3-19-31	4	5	40c s.-a. Jan. 1
Monolith P. C. units[9]	3-19-31	10	12	
National Cem.(Can.) 1st 7's[34]	3-21-31	99½	.....	
National Gypsum A com.	3-24-31	5	5½	
National Gypsum pfd.	3-24-31	40	43	$1 Apr. 1
Nazareth Cement com.[25]	2-21-31	15	.....	
Nazareth Cement pfd.[25]	2-21-31	98	.....	
Newaygo P. C. 1st 6½'s[27]	3-26-31	100¾	101½	
New Eng. Lime 1st 6's[19]	3-23-31	.....	65	
N. Y. Trap Rock 1st 6's	3-24-31	act. sale 99½		
N. Y. Trap Rock 7% pfd.[30]	3- 7-31	95	.....	1.75 qu. Apr. 1
North Amer. Cem. 1st 6½'s	3-24-31	51	52	
North Amer. Cem. com[27]	3-26-31	2	3	
North Amer. Cem. 7% pfd.[27]	3-26-31	18	21	
North Shore Mat. 1st 5's[15]	3-25-31	90	.....	
Northwestern States P. C.[31]	3-21-31	105	120	$2 Apr. 1
Ohio River Sand com.	3-24-31	.....	14	
Ohio River Sand 7% pfd.	3-24-31	.....	98	
Ohio River S. & G. 6's[16]	3-21-31	90	95	
Oregon P. C. com.[20]	3-21-31	9	13	
Oregon P. C. pfd.[20]	3-21-30	87	95	
Pacific CoastAggr. com.[40]	3-21-31	1	2	
Pacific Coast Aggregates pfd.	3-21-31	2½	4	
Pacific Coast Cement 6's[5]	3-19-31	65	74½	
Pacific P. C., new com.	3-20-31	12	.....	
Pacific P. C., new pfd.	3-20-31	69	75	1.62½ qu. Jan. 5
Pacific P. C. 6's	3-20-31	100	.....	
Peerless Cement com.[21]	3-23-31	.....	4	
Peerless Cement pfd.[21]	3-23-31	63	73	1.75 qu. Apr. 1
Penn.-Dixie Cement com.	3-24-31	4⅜	4½	
Penn.-Dixie Cement pfd.	3-24-31	20⅜	21	
Penn.-Dixie Cement 6's	3-24-31	act. sale 70		
Penn. Glass Sand Corp. 6's	3- 4-31	101	103	
Penn. Glass Sand Corp. pfd.	2- 4-31	90	.....	1.75 qu. Apr. 1
Petoskey P. C.	3-24-31	6	7	15c qu. Apr. 1
Port Stockton Cem. com.[9]	3-19-31	No market		
Riverside Cement com.	3-20-31	10	12	
Riverside Cement pfd.[20]	3-21-31	65	68	1.50 qu. Feb. 1
Riverside Cement, A[20]	3-21-31	10	12	15c qu. Feb. 1
Riverside Cement, B[20]	3-21-31	1	2	
Roquemore Gravel 6½'s[17]	3-23-31	98	100	
Sandusky Cement 6½'s, 1931-37[19]	3-23-31	90	100	
Santa Cruz P. C. com.	3-20-31	84	.....	$1 qu. Jan. 1 and $2 ex. Dec. 24
Schumacher Wallboard com.	3-20-31	9⅞	11	25c qu. Mar. 27
Schumacher Wallboard pfd.	3-20-31	20½	23½	50c qu. May 15
Southwestern P. C. units[35]	3-18-31	225	275	
Standard Paving & Mat. (Canada) com.	3-24-31	14½	15	50c qu. Feb. 16
Standard Paving & Mat. pfd.	3-24-31	.....	78	1.75 qu. Feb. 16
Superior P. C., A	3-20-31	34½	37½	27½c mo. Apr. 1
Superior P. C., B	3-20-31	9¾	10¼	25c qu. Mar. 20
Trinity P. C.units[31]	3-21-31	115	128	
Trinity P. C. com.[31]	3-21-31	33	.....	
Trinity P. C. pfd.[27]	3-11-31	107	110	
U. S. Gypsum com.	3-24-31	47½	48½	40c qu. Mar. 31
U. S. Gypsum pfd.	3-24-31	126½	130	1.75 qu. Mar. 31
Wabash P. C.[21]	3-23-31	18	23	
Warner Co. com.[16]	3-21-31	31	32	50c qu. Apr. 15
Warner Co. 1st 7% pfd.[16]	3-21-31	97	101	1.75 Apr. 1
Warner Co. 1st 6's	3-24-31	act. sale 95		
Whitehall Cem. Mfg. com.[30]	3- 7-31	80	.....	
Whitehall Cem. Mfg. pfd.[30]	3- 7-31	50	.....	
Wisconsin L. & C. 1st 6's[15]	3-25-31	90	.....	
Wolverine P. C. com.	3-24-31	.....	3¾	15c qu. Nov. 15
Yosemite P. C., A com.[9]	3-19-31	2	2½	

Quotations by: [1]Watling Lerchen & Hayes Co., Detroit, Mich. [2]Bristol & Willett, New York. [3]Rogers, Tracy Co., Chicago. [4]Butler, Beadling & Co., Youngstown, Ohio. [5]Smith, Camp & Co., San Francisco, Calif. [6]Frederic H. Hatch & Co., New York. [7]J. J. B. Hilliard & Son, Louisville, Ky. [8]Dillon, Read & Co., Chicago, Ill. [9]A. E. White Co., San Francisco, Calif. [10]Lee Higginson & Co., Boston and Chicago. [11]J. W. Jakes & Co., Nashville, Tenn. [12]James Richardson & Sons, Ltd., Winnipeg, Man. [13]Stern Bros. & Co., Kansas City, Mo. [14]First Wisconsin Co., Milwaukee, Wis. [15]Central Trust Co. of Illinois. [16]J. S. Wilson, Jr., Co., Baltimore, Md. [17]Citizens Southern Co., Savannah, Ga. [18]Dean, Witter & Co., Los Angeles, Calif. [19]Hewitt, Ladin & Co., New York. [20]Tucker, Hunter. Dulin & Co., San Francisco, Calif. [21]Baker. Simonds & Co., Inc., Detroit, Mich. [22]Peoples-Pittsburgh Trust Co., Pittsburgh, Penn. [23]A. B. Leach & Co., Inc., Chicago, Ill. [24]Richards & Co., Philadelphia, Penn. [25]Hincks Bros. & Co., Bridgeport, Conn. [26]Bank of Republic, Chicago, Ill. [27]National City Co., Chicago, Ill. [28]Chicago Trust Co., Chicago, Ill. [29]Boettcher & Co., Denver, Colo. [30]Hanson and Hanson, New York. [31]S. F. Holzinger & Co., Milwaukee, Wis. [32]Tobey and Kirk, New York. [33]Steiner, Rouse and Co., New York. [34]Jones, Heward & Co., Montreal, Que. [35]Tenney, Williams & Co., Los Angeles, Calif. [36]Stein Bros. & Boyce, Baltimore, Md. [37]Wise, Hobbs & Arnold, Boston. [38]E. W. Hays & Co., Louisville, Ky. [39]Blythe Witter & Co., Chicago, Ill. [40]Martin Judge Co., San Francisco, Calif. [41]Hemphill, Noyes & Co., New York City. [42]Nesbitt, Thomas & Co., Montreal. [43]Foreman State-National Bank, Chicago. [44]E. H. Rollins, Chicago.

International Cement Corp.'s Annual Report

THE consolidated net income of the International Cement Corp. for the year, after all charges including depreciation, depletion, interest on debentures and federal income taxes, amounted to $4,539,509.51 as compared with $4,950,433.16 for the year 1929. This is equivalent to $7.14 per share on the 635,798 shares of common stock outstanding at the close of the year, as compared with $7.88 per share on the 627,865 shares of common stock outstanding at the close of 1929.

Earnings for the year 1930 are accounted for in the following summary of income and disposition:

INCOME

Net income from operations	$4,539,509.51
Increase in depreciation, depletion and insurance reserves, for which there were no cash expenditures	3,074,082.36
	$7,613,591.87

DISPOSITION

Dividends paid	$2,529,898.00
Invested in capital assets represented by plant enlargements, improvements and additional equipment	2,647,605.02
Increase in net current assets	2,199,833.38
Investment in securities	254,818.14
Surplus adjustments, including obsolete equipment dismantled, less accrued depreciation; acquisition of minority interests in subsidiaries; deferred charges, etc.	*18,562.67
	$7,613,591.87

*Credit.

COMPARATIVE CONSOLIDATED INCOME ACCOUNT OF THE INTERNATIONAL CEMENT CORP. AND SUBSIDIARY COMPANIES

(For the Years Ended December 31, 1930, and December 31, 1929)

	1930	1929	Decrease
Sales, less discounts, allowances, etc.	$27,037,855.08	$28,370,031.69	$ 1,332,176.61
Cost of sales:			
Manufacturing and shipping cost	$14,573,987.56	$15,885,168.93	$ 1,311,181.37
Provision for depreciation and depletion	3,034,578.49	2,772,083.66	*262,494.83
Total cost of sales	$17,608,566.05	$18,657,252.59	$ 1,048,686.54
Manufacturing profit	$ 9,429,289.03	$ 9,712,779.10	$ 283,490.07
Selling, administration and general expense	3,299,511.18	3,512,690.76	213,179.58
Net profit from operations	$ 6,129,777.85	$ 6,200,088.34	$ 70,310.49
Miscellaneous income	346,289.48	420,837.64	74,548.16
Total income	$ 6,476,067.33	$ 6,620,925.98	$ 144,858.65
Interest on indebtedness, provision for income taxes and miscellaneous charges	1,936,557.82	1,670,492.82	*266,065.00
Net income for year carried to surplus account	$ 4,539,509.51	$ 4,950,433.16	$ 410,923.65

CONSOLIDATED SURPLUS ACCOUNT

Balance at December 31, 1929		$13,670,835.90
Add: Net income for the year ending December 31, 1930		4,539,509.51
		$18,210,345.41
Deduct:		
Surplus of subsidiary company in Argentina set aside in accordance with Argentine law	$ 23,874.46	
Increase in reserve for exchange on net current assets in South America and other net adjustments	750,425.99	
Equipment dismantled less depreciation accrued thereon	53,589.32	827,889.77
		$17,382,455.64
Deduct—Dividends paid:		
International Cement Corp.: Common stock	$2,529,289.00	
Subsidiary companies: On capital stock not owned	609.00	2,529,898.00
Surplus—Carried to balance sheet		$14,852,557.64

*Increase.

The corporation's net current asset and investment position was improved to the extent of $2,454,651.52 of which $1,881,526.69 is the increase of cash balance. In view of the fact that construction work at all of the plants is now nearing completion, the cash position can be considered a very satisfactory one, according to President Holgar Struckmann.

Capital expenditures during the year totaled $2,647,605.02 of which the major investments were as follows:

Installation of 6500-kw. steam turbine at the New York plant.

Installation of necessary equipment for the manufacture of additional "Incor" cement at the Pennsylvania plant, increasing the "Incor" capacity of that plant to 450,000 bbl. per year.

Installation of a 375-ft. kiln with necessary equipment and buildings at the Louisiana plant.

Installation of three 280-ft. kilns with necessary equipment at the Dallas, Tex., plant.

Construction of an 800-hp. steel Diesel tugboat for transporting cement from the Cuban plant to Havana.

Installation of an additional kiln with necessary equipment at the Argentine plant, also the purchase of an electric shovel for use in Argentina.

Purchase of additional quarry land for the Pennsylvania and Dallas, Tex., plants.

Acquisition of raw material deposits near Rio de Janeiro and Sao Paulo, Brazil.

As a result of these improvements the corporation's total productive capacity is approximately 24,000,000 bbl. per year, representing an increase of 2,000,000 bbl. over the productive capacity at the close of 1929. The diversified geographical location of this entire production was a very important factor in enabling the corporation to meet the intense foreign and domestic competition which prevailed during the year.

For some time the company has been endeavoring to locate suitable raw materials in Brazil, with the expectation of establishing plants in that country, which at present has a very limited cement production because of the scarcity of satisfactory raw materials.

Propose Brazilian Plant

During the past year the company succeeded in locating two deposits, one near Rio de Janeiro and the other near Sao Paulo. These deposits were core drilled and thoroughly prospected and were found to contain sufficient excellent raw material at each location for the manufacture of a high-grade portland cement for a period of approximately fifty years.

Considering the attractiveness of the Brazilian market and the protection afforded by the favorable tariff now in effect, the directors approved the purchase of the two deposits above referred to and suitable plant sites at Rio de Janeiro and Sao Paulo, as well as the organization of a new subsidiary, which, under date of December 5, 1930, was chartered by the Brazilian government as "Companhia Nacional de Cimento Portland," with a capitalization of 10,000 Contos (equal to $1,196,300 U. S. currency).

Demand for "Incor" Increases

The demand for the corporation's high-early-strength cement, marketed under the trade name "Incor," continues to be very satisfactory. During the year it was deemed advisable to install in the Pennsylvania plant, machinery necessary to increase the production of "Incor" cement to the extent required to meet the demand for this product. Shipments of "Incor" cement during the year increased materially over shipments for the previous year.

Consumption of cement in the United States in 1930 was approximately 6½% less

FINANCIAL REVIEW OF INTERNATION CEMENT CORP.

Year	Productive capacity, barrels	Capitalization: Funded debt and notes	Capitalization: Preferred 7% cumulative	Capitalization: Common no par shares	Sales	Total income	Interest, federal taxes, etc.	Net income	Balance for common	Earnings per share common
1919	2,800,000	$ 3,649,524	.....	238,686	$ 4,492,624	$ 743,039	$ 425,435	$ 317,604	$ 317,604	$1.33
1920	3,200,000	2,636,938	.....	268,139	8,461,896	2,564,009	784,450	1,779,559	1,779,559	6.62
1921	4,450,000	1,840,801	$1,558,000	323,978	9,172,311	2,271,127	741,226	1,529,901	1,475,374	4.55
1922	4,450,000	1,627,758	1,409,700	324,047	9,407,725	1,862,080	437,033	1,425,047	1,318,031	4.06
1923	5,400,000	345,900	1,468,700	364,167	11,289,117	2,972,430	549,853	2,422,577	2,319,225	6.37
1924	7,000,000	.....	3,411,800	400,000	13,683,503	3,771,397	723,890	3,047,507	2,853,917	7.14
1925	12,000,000	.....	9,971,700	500,000	17,713,900	4,638,821	662,436	3,976,385	3,518,462	7.03
1926	14,700,000	.....	9,694,400	562,500	21,623,582	5,236,220	881,020	4,355,199	3,669,441	6.52
1927	16,200,000	.....	9,549,800	562,500	23,671,138	5,420,859	866,687	4,554,172	3,882,983	6.90
1928	20,000,000	18,000,000	.....	618,826	27,595,096	6,576,494	1,427,105	5,149,388	4,893,012	7.90
1929	22,000,000	17,995,500	.....	627,865	28,370,031	6,620,925	1,670,492	4,950,433	4,950,433	7.88
1930	24,000,000	17,995,500	.....	635,798	27,037,855	6,476,067	1,936,557	4,539,509	4,539,509	7.14

COMPARATIVE CONSOLIDATED BALANCE SHEET OF THE INTERNATIONAL CEMENT CORP. AND SUBSIDIARY COMPANIES

ASSETS

	1930	1929	Increase
Current assets:			
Cash in banks and on hand	$ 3,818,615.63	$ 1,937,088.94	$ 1,881,526.69
Marketable securities and accrued interest thereon	13,179.39	7,950.08	5,229.31
Accounts and notes receivable:			
Customers' accounts	2,677,901.91	2,390,050.42	287,851.49
Miscellaneous accounts	114,148.21	201,272.03	*87,123.82
Notes receivable and accrued interest	98,081.85	80,998.91	17,082.94
	$ 2,890,131.97	$ 2,672,321.36	$ 217,810.61
Less: Reserve for doubtful items	125,000.00	91,171.31	33,828.69
	$ 2,765,131.97	$2,581,150.05	$ 183,981.92
Inventories at cost or market, whichever is lower:			
Finished cement and process stocks	2,336,767.81	1,989,336.83	347,430.98
Packages, fuel and general supplies	3,537,817.31	3,648,173.01	*110,355.70
	$ 5,874,585.12	$ 5,637,509.84	$ 237,075.28
	$12,471,512.11	$10,163,698.91	$ 2,307,813.20
Less: Reserve for loss on exchange on net current assets in South America	778,612.77	146,987.07	631,625.70
	$11,692,899.34	$10,016,711.84	$ 1,676,187.50
Investments in securities at market	$ 254,818.14		$ 254,818.14
Capital assets:			
Plants, sites, mineral lands, rights, buildings, machinery and equipment	$60,761,948.99	$58,557,577.10	$ 2,204,371.89
Less: Reserve for depreciation and depletion and other property reserves	17,348,216.00	14,703,281.32	2,644,934.68
	$43,413,732.99	$43,854,295.78	$ *440,562.79
Deferred charges: Bond discount, prepaid expenses, etc.	$ 1,534,777.04	$ 1,606,874.70	$ *72,097.66
	$56,896,227.51	$55,477,882.32	$ 1,418,345.19

*Decrease.

LIABILITIES

	1930	1929	Increase
Current liabilities:			
Accounts payable	$ 1,096,316.68	$ 1,095,711.42	$ 605.26
Accrued interest and expenses	358,174.69	347,495.07	10,679.62
Provision for taxes	459,752.33	363,057.39	96,694.94
	$ 1,914,243.70	$ 1,806,263.88	$ 107,979.82
Insurance reserves	$ 39,503.87		$ 39,503.87
Employes' subscriptions to capital stock	$ 76,367.10	$ 388,664.30	$ *312,297.20
Funded debt: 20-year 5% convertible gold debentures due May 1, 1948	$18,000,000.00	$18,000,000.00	
Less: Retired through conversion into capital stock	4,500.00	4,500.00	
	$17,995,500.00	$17,995,500.00	
Capital stock of subsidiary companies not owned	$ 11,630.000	$ 36,500.75	$ *24,870.75
Capital and surplus:			
Common stock: Authorized, 1,000,000 shares, no par value†; issued, 635,798 shares	$21,850,986.24	‡$21,448,552.99	$ 402,433.25
Surplus of subsidiary company in Argentina set aside in accordance with Argentine law	155,438.96	131,564.50	23,874.46
Earned surplus	14,852,557.64	13,670,835.90	1,181,721.74
	$36,858,982.84	$35,250,953.39	$ 1,608,029.45
	$56,896,227.51	$55,477,882.32	$ 1,418,345.19

*Decrease.
‡627,865 shares.
†197,951 shares reserved for conversion of debentures and 5001 shares for officers and employes under subscription plan.

than in 1929, due largely to general depressed industrial conditions which prevailed. Competition has been very keen due not only to the depression but also to the fact that the tariff of 6 cents per 100 lb. placed on cement has proven insufficient to protect American producers, and the importation of foreign cement along the seaboard continues, to the exclusion of the product from domestic mills.

With reference to the company's foreign properties, the unsatisfactory economic conditions prevailing in Cuba during the year brought about a considerable decline in shipments, and a corresponding reduction in earnings from that source, and in all probability the Cuban plant will be operated on a curtailed basis for quite some time. In Argentina and Uruguay, however, shipments were increased and the company is looking forward to a very satisfactory year in those countries.

Continuous attention has been given to the reduction of costs and with economies effected during the year and those resulting from the various improvements made in the past, the company has succeeded in reducing costs at all plants, and those reductions have to a large extent offset the loss resulting from the decline in shipment and prices during the year. Research work has progressed steadily and has been productive of excellent results and general satisfaction to the trade.

A number of the corporation's employes completed payment on the corporation's stock allotted to them under an employes' stock purchase plan, and 7933 shares of stock were issued to them during the year.

At the close of the year 1930 the corporation's capitalization was as follows, according to the report submitted by Holger Struckmann, president of the company:

Twenty-year 5% convertible gold debentures $17,995,500.

Common stock (no par value, 635,798 shares.

Common stock (no par value), 635,798

The accompanying tabulation shows the data usually submitted in the annual report illustrating the growth of the corporation to the end of 1930.

Revaluation of Consolidated Rock Products Co. Proposed

F. J. TWAITS, president of the Consolidated Rock Products Co., Los Angeles, Calif., in a letter to stockholders, has indicated the probability of a revaluation of the company's properties to a point more consistent with present earning power. Existing valuations of properties as now carried in the balance sheet, it is pointed out, were based on appraisals established on the earnings of predecessor companies taken over a five-year period during which building operations in southern California were on a scale not equaled in 1930 or anticipated in the near future.

An important factor in the present situation is the heavy charges necessary on the basis of present valuation. It is pointed out that approximately 25% of the value of net of sales of $4,331,488, shown in 1930 were charged off for depreciation, depletion and amortization. Actual charges on this account for the year amounted to $1,044,862 and a net loss of $607,106 after all charges was shown.

The company's balance sheet as of December 31, 1930, showed outstanding capitalization consisting of the following: Funded debt, $3,637,000; preferred stock, $7,500,000, and common stock, $794,910. These amounts, together with a paid-in capital surplus of $2,091,571, indicated a total invested capital of $14,023,481. Of total assets aggregating $14,809,843 on December 31, 1930, $13,371,546 was represented by property valuations, indicating that the assets securing the invested capital are comprised principally of property valuations.

Construction Materials Corp. to Make New Bond Issue

STOCKHOLDERS of the Construction Materials Corp., sand and gravel producer, Chicago, Ill., are to vote April 4, 1931, on authorizing company to create and issue $1,500,000 worth of 6% two-year notes and to empower company's subsidiary, Sensibar Transportation Co., to issue $1,650,000 of 6% mortgage bonds, due in 1943. Proceeds of the two issues will be used in part to retire obligations incurred in connection with improvements in the company's boat facilities and for general purposes.

Annual Report of the American Aggregates Corp.

THE following statements are attributed to F. D. Coppock, president of the American Aggregates Corp., Greenville, Ohio, in his annual report to stockholders:

The corporation was seriously affected by the general depression during 1930 in the matter of profit making. In line with the plan of the board of directors and officials at the beginning of last year in the matter of economy and retrenchment, considerable savings in operating costs were made and there was made much less investment in expansion.

It is proposed to continue this policy of strict economy in the matter of fixed overhead, of limiting capital investments, in decreasing production costs wherever possible and at the same time secure all available

AMERICAN AGGREGATES CORP. AND SUBSIDIARIES

(Consolidated Balance Sheet—December 31, 1930)

(After giving effect to the sale of plants, properties and equipment located in the Cincinnati, Ohio, district, and transactions incidental thereto, as provided in definite agreements executed in February, 1931)

ASSETS

Current assets:		
Cash		$ 123,533.29
United States Treasury bonds		45,346.87
Accounts and notes receivable—		
Customers—		
Accounts	$469,520.90	
Notes	241,976.85	$ 711,497.75
Others—		
Accounts	$ 31,713.25	
Notes	82,000.00	113,713.25
		$ 825,211.00
Less—Reserve for bad debts		94,818.11 730,392.89
Inventories—Certified by the management as to quantities, valued at the lowest of cost or market—		
Stock piles, manufacturing materials, supplies, etc.		223,974.04
Total current assets		$1,123,247.09
Prepaid insurance, taxes, etc.		40,346.53
Mortgage notes receivable:		
Due $120,000 serially October 26, 1931 to 1935, inclusive		600,000.00
Investments, advances, etc.:		
Investments in Permanent Concrete Products, Inc. (58.07% owned)	$ 128,610.76	
Investments in American Materials Corp. (50% owned)	172,422.14	
Notes and accounts of stockholders and employes (less reserve)	48,802.17	
Advances for railroad rights-of-way, etc.—Refundable	18,737.50	
Sundry accounts and notes receivable, other than current (less reserve)	58,789.31	
Miscellaneous	14,017.60	441,379.48
Plant and equipment:		
Gross book values	$ 7,495,647.28	
Less—Reserves for depreciation and depletion	2,116,086.93	5,379,560.35
Deferred charges:		
Unamortized bond discount and expense	$ 140,671.38	
Unamortized costs of franchise, contract, right-of-way, etc.	79,477.67	220,149.05
		$7,804,682.50

LIABILITIES

Current liabilities:		
Real estate purchase contracts due in 1931		$ 41,981.95
Notes payable		42,046.20
Accounts payable—		
Trade	$ 50,437.35	
Officers and employes	26,604.06	77,041.41
Reserve for federal income taxes (subject to final review by Treasury Department)		73,374.44
Accrued liabilities—Taxes, interest, royalties, etc.		106,636.09
Total current liabilities		$ 341,080.09
(Sinking fund payment due October 31, 1931—$100,000 in cash or principal amount of debentures.)		
Deferred income		7,389.56
Deferred liabilities:		
Real estate purchase contracts, due 1932-1940	$ 72,600.00	
Notes payable to officers and employes, due in 1932	191,441.45	264,041.45
Fifteen-year 6% sinking fund gold debentures, Series "A," due February 1, 1943:		
Authorized and issued	$ 2,000,000.00	
Less—Redeemed	782,500.00	1,217,500.00
Capital stock and surplus:		
Capital stock—		
Preferred—7% cumulative—Authorized, 25,000 shares, par value $100 each. Issued 24,684 shares	$ 2,468,400.00	
Less—Held in treasury, 6233 shares	623,300.00	
		$1,845,100.00
Common—without par value—Authorized, 350,000 shares (of which 33,019 shares are reserved for the exercise of outstanding stock purchase warrants and options).		
Issued, 227,345 shares	$3,167,100.00	
Less—Held in treasury, 38,518 shares	680,629.31	2,486,470.69
	$ 4,331,570.69	
Capital surplus	633,736.39	
Earned surplus	1,009,364.32	5,974,671.40
		$7,804,682.50

AMERICAN AGGREGATES CORP. AND SUBSIDIARIES

(Consolidated Balance Sheet—December 31, 1930)

ASSETS

Current assets:		
Cash		$ 14,493.56
United States treasury bonds		45,346.87
Accounts and notes receivable—		
Customers—		
Accounts	$ 469,520.90	
Notes	241,976.85	
Other receivables	31,713.25	
	$ 743,211.00	
Less—Reserve for bad debts	94,818.11	648,392.89
Inventories—Certified by the management as to qualities valued at the lower of cost or market—		
Stock piles, manufacturing material, supplies, etc.		258,229.33
Total current assets		$ 966,462.65
Prepaid insurance, taxes, etc.		51,140.18
Investments, advances, etc.:		
Investment in Permanent Concrete Products, Inc. (58.07% owned)	$ 128,610.76	
Investment in American Materials Corp. (50% owned)	172,422.14	
Notes and accounts of stockholders and employes (less reserve)	48,802.17	
Advances for railroad rights-of-way, etc.—Refundable	18,737.50	
Sundry accounts and notes receivable, other than current (less reserve)	58,789.31	
Miscellaneous	16,617.60	443,979.48
Plant and equipment:		
Gross book values	$10,414,703.14	
Less—Reserves for depreciation and depletion	2,671,384.32	7,743,318.82
Deferred charges:		
Unamortized bond discount and expense	$ 140,671.38	
Unamortized costs of franchise, contract, right-of-way, etc.	98,107.72	238,779.10
		$9,443,680.23

LIABILITIES

Current liabilities:		
Real estate purchase obligations		
Due in 1931—Contracts	$ 43,631.95	
Notes secured by purchase money mortgages	24,797.50	$ 68,429.45
Notes payable		42,046.20
Accounts payable—		
Trade	$ 50,437.35	
Officers and employes	26,604.06	77,041.41
Reserve for federal income taxes (subject to final review Treasury Department)		73,374.44
Accrued liabilities—		
Taxes, interest, royalties, etc.		116,732.22
Total current liabilities		$ 377,623.72
(Sinking fund payment due October 31, 1931—$100,000 in cash or principal amount of debentures)		
Deferred income		7,389.56
Deferred liabilities:		
Real estate purchase obligations		
Due 1932-1940—Contracts	$ 350,197.67	
Notes secured by purchase money mortgages	33,595.00	
Notes payable to officers and employes, due in 1932	191,441.45	
Miscellaneous	3,309.11	578,543.23
Fifteen-year 6% sinking fund gold debentures, Series "A," due February 1, 1943:		
Authorized and issued	$ 2,000,000.00	
Less—Redeemed	782,500.00	1,217,500.00
Capital stock and surplus:		
Capital stock—		
Preferred 7% cumulative—authorized 25,000 shares, par value $100 each. Issued and outstanding, 24,684 shares	$ 2,468,400.00	
Common without par value — authorized 350,000 shares (of which 33,019 shares are reserved for the exercise of outstanding stock purchase warrants and options).		
Issued and outstanding 227,345 shares	3,167,100.00	
	$ 5,635,500.00	
Capital surplus	617,759.40	
Earned surplus	1,009,364.32	7,262,623.72
		$9,443,680.23

AMERICAN AGGREGATES CORP. AND SUBSIDIARIES

(Consolidated Profit and Loss Account and Summary of Earned Surplus Account for Year Ended December 31, 1930)

Particulars		Amount
Gravel plants and yards:		
Net sales (after deducting allowances, trade and cash discounts, etc.)		$3,784,837.32
Cost of sales		2,929,069.49
Gross profit on sales		$ 855,767.83
Selling, administrative and general expenses charged to plant and yards		224,415.12
		$ 631,352.71
Income from allied operations		265,836.60
Net profits from gravel operations and income from allied operations, before deducting undistributed selling, administrative and general expenses		$ 897,189.31
Deduct:		
Undistributed selling, administrative and general expenses		265,061.27
Net profits from gravel operations and income from allied operations		$ 632,128.04
Other deductions:		
(Including deferred stripping expenses at December 31, 1930, of $99,290.24 written off by company) — Less miscellaneous income		$ 52,735.58
Net profits before interest and federal income tax		$ 579,392.46
Interest charges:		
Interest on bank loans, etc.	$85,033.31	
Interest on 6% debenture bonds	77,727.93	
Amortization of bond discount and expense, net	10,484.88	173,246.12
Net profits before federal income tax		$ 406,146.34
Provision for federal income tax		$ 69,700.45
Net profits, carried to surplus account		$ 336,445.89
Summary of earned surplus account:		
Balance January 1, 1930		$1,012,442.93
Add—Net profits as above		$ 336,445.89
		$1,348,888.82
Deduct, cash dividends:		
7% Preferred	$171,592.75	
Common	167,931.75	339,524.50
Balance December 31, 1930		$1,009,364.32

NOTE—The increase in capital surplus during the year in the amount of $93,027.92 represents the excess of the consideration received for common capital stock issued over the stated value thereof, in the amount of $63.566, and $29,461.92 in respect of the unused portion of the plant dismantlement reserve.

business in keeping with sound competitive practices and the maintenance of reasonable price levels.

During 1930 the corporation produced and marketed 8,018,810 tons of material as compared with 10,305,020 tons produced and marketed during the year of 1929, or a decrease in tonnage of 2,286,210 tons. This decrease was represented largely by the failure of railways to purchase the usual quantities of ballast and also by a marked decrease in commercial business in Detroit territory. The loss in net sales was $1,282,870 as compared with net sales of 1929.

Notwithstanding the foregoing adverse circumstances, the corporation was able to earn a net profit before federal tax of $406,146.34 and improved its cash position materially by the end of 1930 over that of December 31, 1929.

The present prospects for 1931 indicate that the tonnage will be approximately the same outside of the Cincinnati district as during 1929. The competition may be somewhat more active, yet at this time it is anticipated earning somewhat more per share of stock outstanding than earned in 1930.

The sale of the Cincinnati properties was ratified and approved by the shareholders at their meeting on January 20, 1931, and has been fully consummated. The results of this transaction are evident, as shown on the enclosed consolidated balance sheet, which not only shows the condition at the close of business December 31, 1930, but also the effect after concluding the deal.

A consolidated balance sheet reflecting the condition of our corporation as of December 31, 1930, and prior to the sale of the Cincinnati properties; a consolidated balance sheet as of December 31, 1930, after giving effect to the sale of the Cincinnati properties, and a consolidated profit and loss account and summary of earned surplus account are included.

Recent Dividends Announced

Alpha P. C. com. (qu.)	$0.25	Apr. 25
Arundel Corp. (qu.)	0.75	Apr. 1
American Aggregates pfd. (qu.)	1.75	Apr. 1
Calaveras Cement Co. pfd. (qu.)	1.75	Apr. 15
Dolese and Shepard	1.00	Apr. 1
Dufferin Pav. and Crush. Stone, Ltd., 1st pfd. (qu...)	1.75	Apr. 1
Gypsum, Lime and Alabastine, Ltd. (qu.)	0.20	Apr. 1
Kelley Island Lime and Trans. Co. (qu.)	0.62½	Apr. 1
Lawrence P. C. (qu.)	1.00	Mar. 31
Lehigh P. C. com. (qu.)	0.25	May 1
McCrady-Rodgers pfd. (qu.)	0.87½	Mar. 30
Medusa P. C. com (qu.)	0.75	Apr. 1
Medusa P. C. pfd. (qu.)	1.50	Apr. 1
New York Trap Rock pfd. (qu.)	1.75	Apr. 1
Peerless Cement pfd. (qu.)	1.75	Apr. 1
Republic P. C. pfd. (qu.)	1.75	Mar. 1
Schumacher Wall Board com. (qu.)	0.25	Mar. 27
Schumacher Wall Board pfd. (qu.)	0.50	May 15
Superior P. C. Cl. B (qu.)	0.25	Mar. 20
Wallace Sandstone Quarries pfd.	1.50	Apr. 15

Commission Assigns Work for Cement Investigation

THE Federal Trade Commission has assigned to its chief examiner the details of an investigation of the cement industry as recently called for in senate Resolution 448 which directed the commission to investigate competitive conditions in the industry including importation of cement. The commission is to report as to whether the activities of manufacturers and distributors of cement are in violation of the anti-trust laws or the federal trade commission act.

In carrying on the inquiry the chief examiner will co-operate with the commission's economic division which has already obtained a large volume of data bearing on the cement industry situation.

Louisiana to Have New Lime Plant at Bastrop, of 100 Tons Capacity

ANNOUNCEMENT was made at Bastrop, La., recently, of the incorporation of an organization known as the Louisiana Lime and Stone Co. for the location in Bastrop of a $100,000 lime plant with a capacity of 100 tons of finished lime per 24 hours. This includes chemical, barreling and hydrated material.

The company is incorporated for $100,000, and details of the organization are now being worked out by the incorporators who include local leading citizens. The incorporators are E. B. Folse, president of the Citizens State Bank and Trust Co.; A. G. McBride, president of the Bastrop Chamber of Commerce; C. I. Bacon and F. W. Howard, president Boltz Manufacturing Co. of Bastrop, and John O. Willson of St. Joe, Ark. Mr. Willson has had a number of years of experience in the lime business and will be general manager of the Bastrop plant.

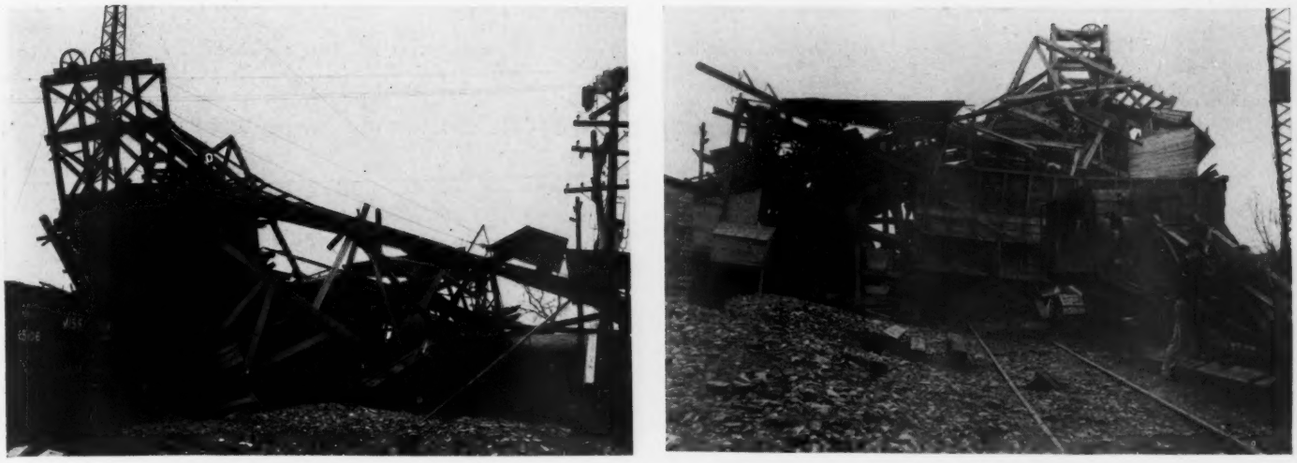
Bastrop was selected for the plant over Monroe, Ruston and other Louisiana cities, it was announced. The company now owns and controls a lime property in Boone county, Arkansas, of 190 acres, which is 300 ft. deep. All the development work on the property has been done by the company, the necessary machinery for quarry operation is in place and the ledge is now ready for immediate operation.

This limestone, which has been announced by chemists to be of an extra high quality, will be shipped in railway cars to the kilns in Bastrop, where it will be burned to produce finishing lime and then will be shipped from Bastrop to the consumer either in bulk, or barrels or in hydrated form.

The location for the plant in Bastrop will be announced within the next few weeks and work on the plant will be started soon thereafter. The initial capacity will be a battery of three kilns of 20 to 30 tons and additional capacity in kilns will be made as required. The estimated cost of a complete installation of this lime plant, which will include hydrating equipment, bins, elevators, conveyors, housing, cooperage, concrete foundation, etc., is approximately $100,000.

The plant will manufacture both chemical and commercial lime, it was announced. Chemical lime is used in the paper, sugar and glass industry, while commercial lime is a plaster and building requirement. One of the outstanding requirements for producing burned lime from the raw stone is the fuel proposition which largely determines the cost of production, and it is because of cheap fuel that Bastrop was selected as the location of this plant. Work will be provided for a number of local men.

It is expected to have the lime plant in operation here within the next few months. —*Monroe* (La.) *Morning World.*



Where a wild box car created havoc at a sand and gravel plant in Arkansas

Arkansas Gravel Plant Wrecked by Box Car

APPROXIMATELY 100 men were given employment here clearing away the debris of the 60-ft. tower of the Ouachita river plant of the Arkadelphia Sand and Gravel Co., which was wrecked February 23 when a Missouri Pacific box car broke loose from the switch engine and crashed with the superstructure of the 60-ft. tower, causing an estimated loss of $20,000.

The men work in 12-hour shifts and Manager Clarence Hawkins has said that all speed will be made in reconstructing the tower in order that his company may resume supplying the heavy demand for sand and gravel from highway contractors.

Only the fact that the workmen, off duty for their noon lunch, had not returned to work, prevented loss of life, it is believed.

A train crew was switching gravel cars, shunted out for the gravel plant, when a box car, too high to pass under the opening in the tower, got away from the crew and struck the tower.

Fifteen or 18 cars of gravel and sand under the structure, weighing nearly 700 tons, was precipitated by the crash and the box car, loaded with timber, was crushed. Heavy machinery in the plant was damaged and represents much of the total loss.

The plant was supplying 30 carloads of gravel a day to highway contractors.—*Little Rock* (Ark.) *Democrat.*

Birmingham Building Material Manufacturers Organize Club

A LUNCHEON CLUB of building material manufacturers has been organized in Birmingham, Ala., and will meet each Friday at noon.

C. V. Orr, of the Gulf States Steel Co., is chairman of the club and W. C. Darby, of the Birmingham Retail Credit Men's Association, is secretary.

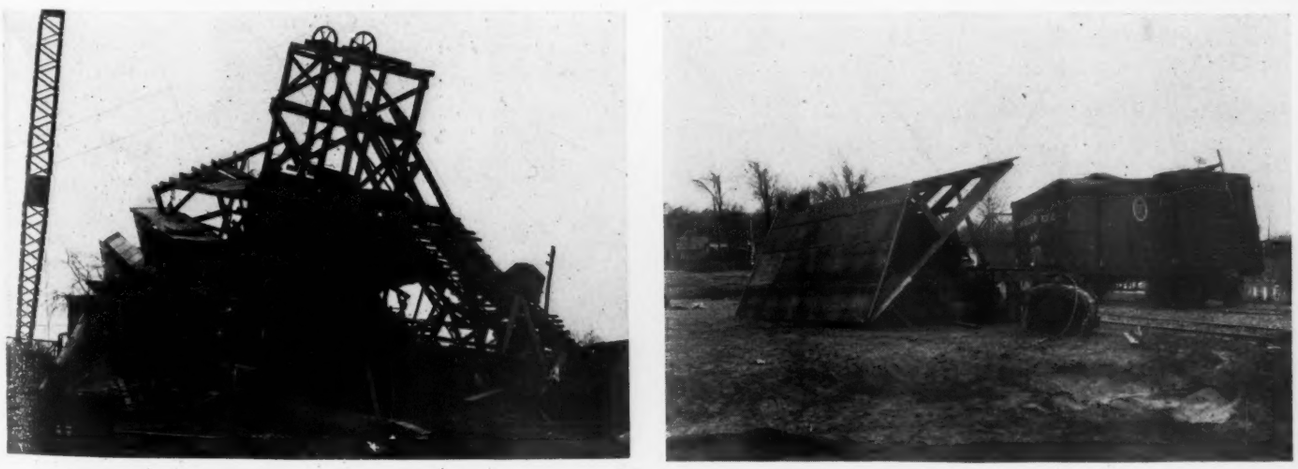
Producers of rock products among the members are: A. C. Woodward, Alpha Portland Cement Co.; N. L. Smith, Birmingham Slag Co.; F. C. Cheney, Cheney Lime and Cement Co.; R. J. Seigfried, Lehigh Portland Cement Co.; C. C. Duff, Lone Star Cement Co.; L. N. Massengale, National Portland Cement Co.; John Purdy, Jr., Universal Atlas Cement Co.; L. D. Burr, Sloss-Sheffield Steel and Iron Co., and J. H. Worrall, Woodstock Slag Co.

New Quarry Operation in Kentucky Ready to Start Operating This Spring

WITH MACHINERY arriving daily, the Greeley Stone Co. will soon be ready to start operating its new stone quarry two miles northeast of Russellville, Ky. The quarry is located on the Morgantown road, and work has been under way since early last fall.

An up-to-date plant has been installed in a splendid location, and it is said the plant will have a capacity of 1000 tons of stone per day. Electric power will be used for operating the machinery, this power to be furnished by the Kentucky-Tennessee Light & Power Co., which concern has already erected the power line to the plant.

Mr. Greeley has had more than twenty years' experience in the crushed stone business, having for a number of years operated a large plant near Indianapolis, Ind. His son will be associated with him in the local plant, and both men have made many friends in Russellville and other sections of the state since coming to Kentucky. —*Russellville* (Ky.) *Democrat.*



The plant was wrecked, and so was the box car

Traffic and Transportation

Car Loadings of Sand and Gravel, Stone and Limestone Flux

THE following are the weekly loadings of sand and gravel, crushed stone and limestone flux (by railroad districts) as reported by the Car Service Division, American Railway Association, Washington, D. C.:

CAR LOADINGS OF SAND, GRAVEL, STONE AND LIMESTONE FLUX

District	Limestone Flux Week ended Feb. 21	Limestone Flux Week ended Feb. 28	Sand, Stone and Gravel Week ended Feb. 21	Sand, Stone and Gravel Week ended Feb. 28
Eastern	1,392	1,437	977	1,157
Allegheny	1,547	1,559	1,345	1,317
Pocahontas	104	93	478	538
Southern	531	423	5,126	6,059
Northwestern	232	244	793	635
Central Western	441	409	3,082	2,975
Southwestern	245	72	3,198	3,233
Total	4,492	4,237	14,999	15,914

COMPARATIVE TOTAL LOADINGS, BY DISTRICTS, 1930 AND 1931

District	Limestone Flux Period to date 1930 Mar. 1	Limestone Flux Period to date 1931 Feb. 28	Sand, Stone and Gravel Period to date 1930 Mar. 1	Sand, Stone and Gravel Period to date 1931 Feb. 28
Eastern	17,367	10,574	16,270	9,205
Allegheny	19,388	12,680	20,426	11,482
Pocahontas	1,523	750	4,277	3,660
Southern	4,854	4,317	50,323	47,958
Northwestern	3,992	1,810	7,374	7,533
Central Western	3,951	3,478	41,327	26,398
Southwestern	2,662	2,288	31,854	26,420
Total	53,737	35,897	171,851	132,656

COMPARATIVE TOTAL LOADINGS, 1930 AND 1931

	1930	1931
Limestone flux	*53,737*	*35,897*
Sand, stone, gravel	*171,851*	*132,656*

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week of March 21:

SOUTHERN FREIGHT ASSOCIATION DOCKET

54252. **Limestone or marble, ground or pulverized,** Sparta, Tenn., to Kingsport, Tenn. Present rate, 314c per net ton. Proposed rate on limestone or marble, ground or pulverized, carloads (See Note 1), except when car is loaded to full visible capacity actual weight will apply (not subject to Rule 34 of Southern Classification), from Sparta, Tenn., to Kingsport, Tenn., 234c per net ton, same as currently in effect to Johnson City, Tenn.

54266. **Limestone,** ground, for agricultural purposes, between all points on the L. & N. R. R. in the state of Tennessee. It is proposed to establish rates on ground limestone for agricultural purposes, in open top cars, carloads, between points on the L. & N. R. R. in the state of Tennessee (intrastate only), the same as apply on crushed stone.

54271. **Sand and gravel,** Petersburg, Puddledock and Hopewell, Va., to Nurney, Va. Present rate, 112c per net ton. (Combination.) Proposed rate on sand and gravel, carloads (See Note 3), from Petersburg, Puddledock and Hopewell, Va., to Nurney, Va., 105c per net ton; reflects the Docket 17517 joint line scale.

54352. Cancellation. **Gravel spar** carloads, (a) Intraterritorially between points in Southern territory, and (b) Interterritorially between points in Southern territory, on the one hand, and points in Trunk Line, New England, Central Freight Association (including the Buffalo-Pittsburgh zone), I. F. A., W. T. L. C. territories and S. W. F. B. (including Kansas-Missouri) territory, on the other. It is proposed to cancel, on the obsolete theory, the rates on gravel spar, carloads, from and to the above named points.

54379. **Stone, crushed,** Atlas, Highland, Limestone, Lawton, Poplar and Rock Crusher, Ky., to L. & N. R. R. stations in Kentucky. It is proposed to establish rates on crushed stone, carroads (See Note 3), from Atlas, Highland, Limestone, Lawton, Poplar and Rock Crusher, Ky., to L. & N. R. R., Kentucky Division stations, Falmouth, Ky., to Richmond, Ky., inclusive, also stations on the Paris, Ky., to Maysville, Ky., branch, in lieu of the present combination basis. Statement of rates will be furnished on request.

54392. **Sand and gravel,** from Petersburg, Puddledock and Hopewell, Va., to Sou. Ry. stations in Virginia. It is proposed to establish rates on sand and gravel, carloads, from Petersburg, Puddledock and Hopewell, Va., to Sou. Ry. stations, Broadnax, Va., to West Norfolk, Va., inclusive, on basis of the Trunk Line Scale prescribed by the Interstate Commerce Commission in Docket 17517 for distances via N. & W. Ry., Suffolk, Va., and Sou. Ry.

SOUTHWESTERN FREIGHT BUREAU DOCKET

22451. **Gravel, crushed stone and sand,** between Webb City and Carterville, Mo., and points in Oklahoma. To amend Item 6998G, S. W. L. Tariff 44-O, applying on gravel, crushed stone and sand, carloads, by adding Webb City and Cartersville, Mo., to the list of Missouri points named in Note 1 of the item. Proposal 21595 proposed addition of Kiddo, Mo., to the list of Missouri points in Item 6998-series, and this change has been made in Sup. 105, effective March 15, 1931. The shipper at Webb City, Mo., requests that similar publication be made from that point to enable him to compete on a relative basis with the shippers at other points in this district. As Webb City is only six miles beyond Joplin, Mo., from which point the mileage scale applies, it is felt that the proposed change is proper. Carterville, Mo., is added, as this point usually takes same rates as Webb City.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

22514. **Sand,** from Wichita and Mulvane, Kan., to Missouri points. To cancel present rate of 6½c per 100 lb. on sand, carloads, from Wichita and Mulvane, Kan., to J. & P. Ry. stations, viz., Asbury Carl Jct., Chitwood, Joplin, Waco and Webb City Road, Mo. Present rates to the above stations are lower than at directly intermediate points due to the fact that rates to the intermediate points are class rates. Rates applying between points in Kansas were canceled June 26, 1930, allowing the rates published in W. T. L. Tariff 210 to apply on intrastate traffic and class rates on interstate traffic. It is stated that the lower rates to points beyond the Kansas border should have been cancelled at that time, but through oversight no action was taken and the above is for the purpose of removing fourth section departures.

CENTRAL FREIGHT ASSOCIATION DOCKET

27779. Toestablish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) **and gravel,** carloads (See Note 3), Rates in cents per net ton.

From—	Pro. rates	Pres. rates
Attica, Ind.	113	122
Lafayette, Ind.	121	130

Route via Wabash Ry. direct.

27784. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) **and gravel,** carloads (See Note 3), from Winona Lake (Warsaw), Ind., to Ohio City, O., rate of $1 per ton of 2000 lb. Present, sixth class rate of 14c. Route via Wabash Ry. direct.

27795. To establish on **sand, silica and limestone,** ground or pulverized, carloads (See Note 3), in straight or mixed carloads, from Hartford City, Ind., to Gas City, Ind., rate of 75c per ton of 2000 lb., proposed rate to expire 90 days from the effective date. Present, 9c (sixth class). Route via Wabash Ry. direct.

27804. To cancel rate of 46c per ton of 2240 lb. on **limestone, furnace or foundry,** carloads (See Note 1), minimum weight marked capacity of car, except when car is loaded to full cubical or visible capacity, actual weight will apply, also rate of 63c per ton of 2240 lb. on limestone, other than furnace or foundry, minimum weight 50,000 lb., from Robinson, Penn., to New Castle, Penn., as named in P. & L. E. R. R. Local Freight Tariff B No. 2864.

27808. To establish on **fluxing stone,** carloads (See Note 3), from Monon, Ind., to South Chicago, Ill., rate of 77c per net ton. Route: Via C. I. & L. Ry., Hammond, Ind., I. H. B. R. R. Present, 90c per net ton.

27819. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) **and gravel,** carloads (See Note 3), from Wolcottville, Ind., to Spencerville, O., rate of $1.10. Route: Via P. R. R., Decatur, Erie R. R. Present: Classification basis.

27823. To establish on **gravel and sand,** except blast, core, engine, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica, in straight or mixed carloads, in open top equipment, carloads (See Note 3), from Moravia, Penn., to destinations in Maryland, Pennsylvania, Ohio and West Virginia rates as shown below, rates in cents per 2000 lb.

20 miles and under	60
40 miles and over 20	70
60 miles and over 40	80
80 miles and over 60	90
100 miles and over 80	100
125 miles and over 100	110
150 miles and over 125	120
175 miles and over 150	120
200 miles and over 175	140

Rates for single line hauls, for joint hauls, add 20c per ton.

27824. To establish on **gravel and sand,** in open top cars, carloads (See Note 3), from Dresdon, O., rates in cents per ton of 2000 lb.:

To Ohio points	Rates	To Ohio points	Rates
Conesville	70	Barr	80
Fresno	70	Dundee	85
Chili	70	Beach City	85
Baltic	80	Justic	85
Sugar Creek	80	Harmon	90

Route: Via Coshocton, O., and W. & L. E. R. R. Present, no commodity rates in effect.

27825. To establish on **molding sand,** carloads (See Note 3), from Evansville, Rockport and Sandale, Ind., rates in cents per ton of 2000 lb.

To	Pres.	Prop.
Chicago, Ill.	227	214
North Chicago, Ill.	265	254
Waukegan, Ill.	265	254
Milwaukee, Wis.	290	254
Kenosha, Wis.	290	254

27826. To establish on **crushed stone and crushed stone screenings,** carloads (See Note 3), from Marblehead, O., to Kalamazoo and Woodbury, Mich., in connection with the C. K. & S. Ry., rate of 165c per ton of 2000 lb. Present, no through rates. Combination as follows: 26c per net ton Marblehead, O., to Danbury, O. Sixth class rates as shown below beyond:

Kalamazoo, Mich.	19½c
Woodbury, Mich.	19c

27880. To establish on **crushed stone** (in bulk), **crushed stone screenings** (in bulk) **and agricultural limestone** (not ground or pulverized), in bulk, in open top cars) (See Note 3), from Sandusky, O.

To	Pres. rate	Pro. rate
La Carne, O.	60	50
Oak Harbor, O.	60	50

27887. To establish on **sand** (except blast, core, engine, filter, fire or **furnace,** foundry, glass, grinding or polishing, loam, molding or silica) **and gravel,** carloads (See Note 3), from Columbus, Ind., to Grammer, Ind., rate of 80c per net ton. Route, P. R. R., Seymour, Ind., C. M. St. P. & P. R. R. Present, 97c per net ton.

27892. To establish on **crushed stone**, carloads (See Note 3), from Thrifton, O., to Cincinnati, O., rate of 70c per net ton. (Rate is net to B. & O. R. R. No connecting line switching will be absorbed at point of origin). Route, via B. & O. R. R. direct. Present, 80c per net ton.

27874. To establish on **crushed stone** (in bulk), **crushed stone screenings** (in bulk) **and limestone, unburned, agricultural** (in bulk, in open top cars only), carloads (See Note 3), from Sandusky, O., to stations in Michigan, rates as shown in Exhibit A attached. Present rates—Sixth class basis except at Detroit, Mich., and Jackson, Mich., $1 and $1.61 respectively.

EXHIBIT A

To	Prop. rate from Sandusky, O.	Pres. rate from Marblehead, O.	To	Prop. rate from Sandusky, O.	Pres. rate from Marblehead, O.
Adrian	110	110	Jonesville	117	117
Albion	125	125	Kalamazoo	145	145
Alma	145	145	Kent City	175	175
Ann Arbor	115	115	Lakeland	120	120
Ashley	140	140	Lake Odessa	155	155
Bad Axe	175	175	Lansing	135	135
Battle Creek	135	135	Lapeer	135	135
Bay City	145	145	Lawndale	145	145
Belding	155	155	Lowell	155	155
Birch Run	140	140	Lyons	145	145
Blackman	140	140	McCords	155	155
Blanchard	165	165	Manchester	107	107
Bridgeport	145	145	Marshall	130	130
Brighton	125	125	Martin	155	155
Cassopolis	155	155	Midland	155	155
Caro	155	155	Mt. Morris	135	135
Charlotte	135	135	Muskegon	185	185
Clifford	*145	*145	Napoleon	115	115
Clio	135	135	Newaygo	175	175
Clyde	125	125	Niles	155	155
Comstock Pk.	165	165	N. Morenci	139	139
Creen	145	145	Northville	120	120
Delta	140	140	Novi	120	120
Detroit	95	95	Otisville	135	135
Dundee	110	110	Otter Lake	140	140
Durand	130	130	Owosso	135	135
Eagle	145	145	Oxford	130	130
E. Saugatuck	175	175	Paines	145	145
Eaton Rapids	130	130	Plainwell	155	155
Edmore	165	165	Plymouth	120	120
Elwell	165	165	Pontiac	130	130
Flint	135	135	Reese	145	145
Fostoria	145	145	Richmond	130	130
Freeland	145	145	Rives Jct.	125	125
Freeport	155	155	Romulus	115	115
Fraser	125	125	St. Johns	135	135
Gera	145	145	Saginaw	145	145
Gobles	155	155	Salem	120	120
Gowen	165	165	Schoolcraft	145	145
Grand Blanc	130	130	Sebewaining	155	155
Grand Haven	185	185	Sheridan	155	155
Grand Ledge	145	145	South Haven	165	165
Grand Rapids	†155	†155	Sparta	165	165
Grassmere	165	165	Sturgis	135	135
Greenville	155	155	Tecumseh	102	102
Hartford	185	185	Three Rivers	145	145
Hastings	145	145	Tuscola	155	155
Hillsdale	115	115	Vicksburg	145	145
Holland	175	175	Vriesland	165	165
Holly	130	130	Wasepi	135	135
Howard City	165	165	Wayne	115	115
Howell	125	125	Webberville	130	130
Hudson	107	107	Woodbury	145	145
Ionia	155	155	Ypsilanti	139	139
Jackson	117	117			

*G. T. delivery—$1.65 for P. M. delivery.
†N. Y. C. delivery—$1.65 for P. R. R. and P. M. delivery.

27915. To establish on **sand and gravel**, carloads (See Note 3), from Evansville, Ind., to points in Indiana (representative points shown in Exhibit A), rates as shown in Exhibit A attached. Present rates as shown in Exhibit A.

EXHIBIT A

Sand and Gravel, from Evansville, Ind., to representative Indiana points on C. C. C. & St. L. Ry. (E. I. & T. H. Ry. Div.)

To	Pres.	Prop.	To	Pres.	Prop.
Massey	80	75	Elnora	115	90
Little	80	75	Lester	115	100
Hosmer Siding	80	75	Ellison	115	100
Glezen	80	75	Worthington	*115	100
Ashby	80	75	Hubbell	123	105
Blackburn	88	80	Matthews	123	105
Bennett	88	80	Mancourt	123	105
Rogers	88	80	Coal City	123	105
Greenmount	88	80	Lancaster	123	105
Maysville	95	80	Clay City	123	105
King	107	85	Eel River	123	105
Graham	107	85	Saline City	125	110
Albright	107	90	Riley	125	110
Plainville	107	90	Terre Haute	130	115

*Rates based on mileage scale shown in Section 4, C. C. C. & St. L. Ry. Tariff 1703P.

27914. To establish on **agricultural limestone**, unburned, in open top cars; **stone, crushed**, in open top cars, in bulk only; **stone screenings**, in open top cars, in bulk only, in straight or mixed carloads (See Note 3), from Marble Cliff, O., to Armstrong, O., rate of $1.15 per net ton. Route—P. R. R., Wooster, O., B. & O. R. R. Present, 17c.

27921. To establish on **crushed stone** (in bulk) **and limestone, unburned, agricultural** (in bulk), in open top cars (See Note 3), from Kenton, O., to N. Y. C. R. R. Stations:

To Ohio points	Prop.	Pres.	To Ohio points	Prop.	Pres.
Fultonham	80	100	Drakes	100	110
Zanesville	100	120	Shawnee	100	110
Crooksville	90	100	Hartleyville	100	110
Tropic	100	110	Hunterdon	100	*340
Tatmans	100	110	Calvin	110	†390

*Sixth class. †Sixth class.

TRUNK LINE ASSOCIATION DOCKET

26192. **Sand**, carloads (See Note 2), from South Lakewood and Farmingdale, N. J., to Plainfield, N. J., 70c per net ton. (Present rate 80c per net ton.) Reason: To meet motor truck competition.

26197. **Roasted dolomite**, carloads (See Note 2), from Bainbridge and Union Stone Co., Penn., to Bethlehem, $2.02 per gross ton. (Present rate, 13½c per 100 lb.) Reason: Proposed rate is comparable with rates from Bainbridge to Trenton, Florence, N. J., and Johnstown, Tenn.

26212. To establish on **ground flint**, carloads, minimum weight 40,000 lb., from Conowingo, Md., to points of destination in Agent Curlett's I. C. C. A265 taking Rate Basis 60A to 120, inclusive, the same rates as applicable on glass sand per Philadelphia Rate Group 29 of Agent Curlett's I. C. C. A265. Reason—Proposed rates are fairly comparable with rates from Trenton, N. J., Berkeley Springs, Va., and Mapleton, Penn.

26221. **Sand, common or building** (not blast, engine, fire, foundry, glass, molding or silica), carloads, **and gravel**, carloads, (See Note 2), from Junius and Oaks Corners, N. Y., to Dox, N. Y., 70c per net ton. (Present rate, 75c per net ton.) Reason—To meet motor truck competition.

26224. **Limestone, unburnt, ground or pulverized, carloads**, minimum weight 50,000 lb., from Grove, Frederick, Keller, Buckeystown, Md., Engle and Martinsburg, W. Va., to Bridgeton, N. J., 13c per 100 lb. (Present rate, 14½c per 100 lb.) Reason—Proposed rates are fairly comparable with rate from Thomasville, Penn.

26226. **Sand, building, engine, blast, glass, molding and ground flint**, carloads (See Note 2), from Berkeley Springs, Great Cacapon and Hancock, W. Va., to Barre, Va., $4.30 per net ton. Reason—Proposed rate is comparable with rate from Mapleton district.

26234. **Gravel and sand** (other than blast, engine, fire, glass, molding, foundry, quartz, silex or silica), carloads (See Note 2), from Pt. Covington to Hampstead, Md., *70c per net ton, also **stone, crushed or broken**, and **stone screenings**, carloads (See Note 2), from Bittinger and Thomasville, Penn., to Hampstead, Md., *70c per net ton. *To expire December 31, 1931. Reason—To meet motor truck competition.

6235. To amend all tariffs applying from Martinsburg, W. Va., on **stone, crushed, coated with oil, tar or asphaltum**, to the extent of changing the carload minimum weight to read: "Minimum weight 90% of marked carrying capacity of car ordered, but not less than 90,000 lb., except when car is loaded to full cubical or visible capacity actual weight will apply."

26238. **Phosphate rock, crude lump, ground or dissolved**, and superphosphate (acidulated phosphate rock), in bulk, in straight or mixed carloads, minimum weight 40,000 lb., from Baltimore, Md., to Westminster, Md., $1.70 per net ton. Present rate, $1.90 per net ton. Reason—To meet motor truck competition.

26242. **Limestone, ground or pulverized**, carload, minimum weight 50,000 lb., from Munns, N. Y., to D. & H. stations, Binghamton, Unadilla, Worcester, Cobleskill, Central Bridge, Windsor, Cooperstown, N. Y., and various, rates ranging from $1.60 to $2 per net ton. Reason—Proposed rates are fairly comparable with rates from Jamesville, N. Y.

26246. **Stone, natural** (other than bituminous asphalt rock), **crushed, coated with oil, tar or asphaltum**, carloads (See Note 2), from South Bethlehem, N. Y., to N. Y. C. R. R. stations, Bronxville, White Plains, Chappaqua, Katonah, Lake Mahopac, Pawling, Sharon, Philmont, Nepera Park, Pocantico Hills, Croton Lake, Amawalk, Mahopac, Tilly Foster and various, rates ranging from $1 to $1.55 per net ton. Reason—Proposed rates are comparable with rates on crushed stone between the same points.

26247. **Gravel and sand**, other than blast, engine, foundry, molding, glass, silica, quartz or silex, carloads (See Note 2), from Arundel, Md., to P. R. R. points, Philadelphia, Woodbine, Penn., Newark Centre, Del., Colebrook, Lebanon, Penn., Principio, Perryville, Stemmers Run, Kenwood, Bowie, Popes Creek, Phoenix, Union Bridge, Frederick, Md., Oxford, Penn., Chestertown, Bishop, Fruitland, Beaver Dam, Md., and various, rates ranging from 60c to $1.85 per net ton. Reason—Proposed rates are fairly comparable with rates on like commodities for like distances, services and conditions.

26251. **Ground limestone**, carloads, minimum weight 50,000 lb., from Stover, Penn., to D. & H. points, Windsor, Cherry Valley, Mechanicsville, Saratoga Springs, North Creek, Delano Junction, Saranac Lake, Lake Placid, N. Y., and various, rates ranging from 16c to 31½c per 100 lb. Reason—Proposed rates are comparable with rates from Frederick, Md.

26256. **Gravel and sand** (other than blast, engine, fire, glass, molding or foundry) **and stone, crushed or broken, and stone screenings**, carloads (See Note 2), from Cumberland, Md., to Western Maryland Railway stations, Hagerstown, Charlton, Ashton, Vaughan, Round Top, Keifer, Spring Gap, Md., Snyder, Cherry Run, Jerome, Ridgely, W. Va., and various, rates ranging from 60c to $1 per net ton. Reason—Proposed rates are comparable with rates on like commodities for like distances, services and conditions.

26260. **Gravel and sand** (other than blast, core, engine, fire, foundry) in straight or mixed carloads, in open top equipment, from Machias, N. Y., to Sargeant, Warren, Corry, Union City, Struths, West Hickory, Centerville, Spartansburg, Penn., Wolf Run, Sheridan, N. Y., and various, rates ranging from 90c to $1.40 per net ton. Reason—Proposed rates are comparable with rates from and to points in the same general territory.

26268. **Gravel and sand** (other than blast, engine, fire, foundry, glass, molding or silica), carloads (See Note 2), from Mt. Bethel, Portland and Stier, Penn., to New Ringgold, Penn., $1.25 per net ton; present rate, $1.75 per net ton. Reason—Proposed rate is comparable with rates on like commodities for like distances, services and conditions.

26272. **Sand**, other than blast, engine, foundry, molding, glass, silica, quartz or silex, carloads (See Note 2), from Coatesville, Penn., to Leaman Place, Penn., 70c per net ton; Lancaster, Penn., 85c; Columbia, Wrightsville and Mt. Joy, Penn., 95c; Lebanon and Harrisburg, Penn., $1.15; York, Penn., $1.05, and Westmont, N. J., $1.15 per net ton. Reason—Proposed rates are comparable with rates on like commodities for like distances, services and conditions.

26287. **Stone, crushed or broken**, carloads (See Note 2), from Oriskany Falls, N. Y., to French Road Siding, New Hartford, N. Y., 40c per net ton; present rate, 60c per net ton. Reason—To meet motor truck competition.

26302. **Refuse limestone, ground**, carloads (See Note 2), from Lime Crest, N. J., to Brooklyn Eastern District Terminal, N. Y., $2.10 per net ton. Reason—Proposed rate is fairly comparable with rate to New York Lighterage Station, N. J.

26307. **Common sand**, carloads (See Note 2), from Palermo, N. J., to Tuckahoe, N. J., $20 per car. Present rate 69c per net ton. Reason—To meet motor truck competition.

26309. **Stone, fire and ganister**, carloads (See Note 2), to Benwood, W. Va., from Cumberland, Md., $1.90 and from Berkeley Springs, W. Va., $2.10 per net ton. Reason—Proposed rates are comparable with rate to Wheeling, W. Va., and Bellaire, O.

26311. **Crushed stone**, carloads (See Note 2), from Port Richmond (Philadelphia), Penn., to Tuckahoe, N. J., 85c per net ton; present rate, $1.15 per net ton. Reason—To meet motor truck competition.

26312. (a) **Sand** in open top cars, carloads; (b) sand in box cars or closed equipment, carloads (See Note 2), from Toms River, N. J.

To	Proposed rate (a)	(b)
Wilmington, Del.	160	180
Downingtown, Penn.	160	180
Kennett Square, Penn.	200	225
Frederick, Md.	245	265
Plymouth Meeting, Penn.	165	185
Blue Bell, Penn.	165	185

The above rates in cents per 2000 lb.

Reason—Proposed rates are fairly comparable with rates to Philadelphia, Harrisburg, Reading, Penn., and Baltimore, Md.

26317. **Stone, crushed, coated with oil, tar or asphaltum**, carloads (See Note 2), from Casparis, Penn., to stations on the B. & O. R. R. west of Harpers Ferry, W. Va., in states of West Virginia, Maryland, Pennsylvania and Virginia, also to points on the B. & O. R. R. south of Harpers Ferry, W. Va., to and including Strasburg, Va., on basis of mileage and rates ranging from 10 miles and under, 96c, to scale of miles and rates of 400 miles and over 370 miles, $3.03 per net ton. Reason—Proposed rates are fairly comparable with rates from Martinsburg, W. Va.

26323. **Sand and gravel**, carloads (See Note 2), from Raritan River R. R. stations, South Amboy to New Brunswick, N. J., incl., to Newark, N. J., 80c per net ton. Present rate, 92c per net ton. Reason—Proposed rate is comparable with rates

on like commodities for like distances, services and conditions.

26324. **Gravel and sand** (other than blast, engine, fire, glass, molding or foundry, quartz, silex and silica), carloads (See Note 2), from Baltimore (Port Covington), Md., to New Windsor, Md., 80c per net ton. Present rate, 90c per net ton. Proposed rate to expire December 31, 1931. Reason—To meet motor truck competition.

NEW ENGLAND FREIGHT ASSOCIATION DOCKET

22180. **Lime, agricultural and limestone, ground,** in straight or mixed carloads, minimum weight 60,000 lb., from Stanbridge, Que., to Randolph, Bethel, Royalton, South Royalton, Sharon, West Hartford, Hartford and White River Jct., Vt. Present, 16c; proposed, to Hartford and White River Jct., Vt., 8c; to other points, 7½c. Reason—To establish same basis of rates now enjoyed by other shippers on the C. V. Ry.

22131. **Limestone,** minimum weight 50,000 lb., from North Pownal, Vt., to Johnsonville, Valley Falls and Schaghticoke, N. Y. Present, 6c, minimum weight 40,000 lb.; proposed, 5c. Reason—To meet motor truck competition.

ILLINOIS FREIGHT ASSOCIATION DOCKET

3985. **Sand and gravel,** carloads (See Note 1), except when car is loaded to full cubical or visible capacity actual weight will apply, from Allison Branch to Claremont, Olney and Noble, Ill. Rates per net ton.

To	Pres.	Prop.
Claremont, Ill.	76	65
Olney, Ill.	76	65
Noble, Ill.	76	70

6061. To provide for the non-application of the class rates provided in Tariff 256 for application to shipments of **crushed stone** from St. Louis, Mo., and points within the St. Louis switching district as per Agent Johanson's Switching District Tariff 1 series to points in Illinois Rate Committee territory.

3950. (Sub. 1, Part 2). **Sand, silica, washed or processed,** carloads (See Note 3), from Oregon, Ill., rates per net ton. Proposed—To Chattanooga, Tenn., $4.15; Nashville, Tenn., $3.70; Atlanta, Ga., $4.50; Elberton, Ga., $4.65; Macon, Ga., $4.65. Present—Combination.

WESTERN TRUNK LINE DOCKET

6952-A. **Stone, crushed,** carloads, from Illinois producing points, to stations in Iowa. Rates: Present, various; proposed, I. C. C. 21755 sand and gravel single line scale subject as minima to the Iowa interstate single line rate on crushed stone. Minimum weight, present, various; proposed (See Note 1).

2051-PP, Sup. 1. **Stone, crushed,** carloads (See Note 3), but not less than 40,000 lb., from Jasper, Pipestone, Quartzite, Minn., and Sioux Falls, S. D., to points in Iowa on the C. B. & Q.: Osceola to and including Bloomfield, via Van Wert, Humeston and Sedan. Rates: Present, combination rates; proposed, 11c per 100 lb.

2898-J. **Sand and gravel,** carloads (See Note 3), but in no case shall the minimum carload weight be less than 40,000 lb., from Hawarden and Lakewood, Ia., to Beaver Creek and Luverne, Minn. Rates—From Hawarden, Ia., to Beaver Creek and Luverne, Minn. Present, 10c; proposed, 5.5c from Lakewood, Ia., to Beaver Creek and Luverne. Present, 5c; proposed, 3.5c.

2814-D. **Stone, crushed and stone dust** (See Note 3), but in no case shall the minimum weight be less than 40,000 lb., from Pinehille, Mich., to Chicago and Joliet, Ill. Rates: Present, 13½c per 100 lb., or $2.70 per net ton; proposed, crushed stone, $2.25 per net ton; stone dust, $1.75 per net ton.

2556-V. **Sand,** carloads, carloads (See Note 2), but not less than 40,000 lb., from Hager, Wis., to the same destinations as shown in Item 4360 of W. T. L. Tariff 49-R. Rates—Present, no commodity rates in effect; proposed, to establish the same commodity rates as now published from Bay City, Wis.

I. C. C. Proposed Report

15806. Cement. With a view to ironing out a situation on cement rates in Florida created by the refusal of the Florida commission to permit railroads to establish rates on that commodity in arbitrary or differential territory in that state on the basis indicated by the Interstate Commerce Commission, Examiner John T. Money in No. 15806, Lehigh Portland Cement Co. vs. A. & R. et al., and a sub-number thereunder, Tidewater Portland Cement Co. vs. same, has recommended that the commission modify the original report, 132 I. C. C. 427, so as to establish a new line between standard and differential territory in Florida. The main reason for the recommendation, the report indicates, is that since the inauguration of the proceedings which resulted in the prescription of rates into Florida, a cement mill has been established at Tampa, Fla.

Cement manufacturers outside of Florida had this case reopened because they contended that the Tampa mill had an advantage over them by reason of the failure of the carriers to establish rates in accordance with the commission's original report and in line with the prior reports, I. C. C. 484, 147 I. C. C. 303 and 155 I. C. C. 339.

The Florida Portland Cement Co., operator of the newly established plant at Tampa, intervened in this case. Examiner Money said that it opposed in every particular the position of the cement manufacturers outside of Florida. Among the contentions put forward by the Florida Portland Cement Co. was one to the effect that this proceeding did not include cement moving from the manufacturing point in Tampa to destinations in Florida arbitrary territory. Examiner Money said that that contention was without merit.

Examiner Money recommended "that the original finding herein fixing the dividing line between standard and arbitrary territory in Florida along the Jacksonville-River Junction line of the Seaboard be modified and that such dividing line be fixed along the line of the Atlantic Coast Line from Jacksonville through Palatka, Orlando and Lakeland to Plant City and the line of the Seaboard Air Line from Plant City to Tampa, and that the standard basis of rates previously prescribed in this proceeding be established from, to and between points on and north and west of such line in Florida, and that such standard basis plus the differentials named in the original decision be prescribed for application from, to and between points in the territory south and east of such lines, such arbitraries to be based upon the distance under the formula previously prescribed herein for the haul in arbitrary territory, and to accrue to the lines operating in such arbitrary territory, in addition to their division out of the through rates."

Drawing of such line would place the Tampa plant in the origin territory with competing cement plants which objected to the adjustment caused by the refusal of the Florida commission to allow the arbitrary basis to be applied on intrastate traffic in the manner prescribed for application on interstate traffic.—*Traffic World.*

I. C. C. Decisions

22557. Sand and gravel. Fuller Construction Co. vs. Missouri Pacific Railroad Co. In the original report, 165 I. C. C. 796, division 5 found that the rate charged on sand and gravel, in carloads, from Memphis, Tenn., to Bridge Junction, Ark., was unreasonable. Reparation was awarded. Upon petition of defendant the case was reopened for reconsideration on the record, and on reconsideration the decision of unreasonableness was reversed and the complaint dismissed.

21323. Lime. A readjustment of the rates on common lime, hydrated, quick or slaked, from various points in southern territory and from Genoa, Woodville, and Gibsonburg, O., to St. Petersburg and Clearwater, Fla., has been ordered to be made not later than May 25, in No. 21323, Dann-Gerow Co., Inc., et al. vs. A. C. L. et al. The Interstate Commerce Commission, by division 3, has found the rates unreasonable for the future to the extent that they may exceed those made in accordance with scales set forth in an appendix to the report. The commission said that the rates would be unreasonable to the extent they might exceed rates determined by the application of the distance scales applied to the entire distance plus arbitraries shown in another appendix for that part of the haul south of the Seaboard Air Line extending from River Junction to Jacksonville, Fla., the distances to be computed over the shortest routes over which carload traffic could be moved without transfer of lading. The commission said that the railroads might maintain reasonable groups of points of origin under the rates prescribed, basing the group rates on average distances from all points included in such groups. It said that the rates assailed were not unjustly discriminatory or unduly prejudicial. There are two main scales, one based on a 30,000 lb. minimum and the other on a 50,000 lb. minimum.

The 30,000 lb. scale begins with a rate of 70c a net ton for the initial block of 5 miles, goes to 170c at 50 miles and 210c at 70 miles. Ten cents are added to each 5-mile block rate for joint-line hauls up to the 70 mile block at which the joint-line rate is 220 cents. From that distance on the scale provides the same rate for both joint and single-line hauls, beginning with 220c for 80 miles, becoming 240c for 100 miles, 290c for 200 miles, 340c for 320 miles, 360c for 400 miles, 410c for 600 miles, 460c for 800 miles, 510c for 1000 miles, 560c for 1200 miles and running out with a rate of 610c for 1400 miles.

The scale, based on a 50,000 lb. minimum, begins with 56c for the initial 5 mile block, goes to 136c for the 50 mile block and 168c for the 70 mile block. Eight cents are added for each block for joint-line hauls, the joint-line rate being 176c for the 70 mile haul. The scale for both joint and single-line hauls begins with a rate of 176c for 80 miles, goes to 192c for 100 miles, 232c for 200 miles, 272c for 320 miles, 288c for 400 miles, 328c for 600 miles, 368c for 800 miles, 408c for 1000 miles, 448c for 1200 miles and 488c for 1400 miles.

The arbitrary scales are also based on minima of 30,000 and 50,000 lb. The 30,000 minimum scale begins with a rate of 48c for 60 miles and runs out with a rate of 53c at 70 miles. The joint-line arbitraries for 60 miles and 70 miles are 50c and 55c. The arbitrary is 60c at 100 miles, 73c at 200 miles, 85c at 320 miles, 90c at 400 miles, and runs out with a rate of 98c for 520 miles. The arbitrary scale for 50,000 lb. begins with a rate of 38c for 68 miles, single-line, and ends with a rate of 42c for 70 miles. The joint-line arbitraries for those distances are 42c and 44c. The arbitraries on that minimum, without regard to single or joint-line hauls, are 48c at 100 miles, 58c at 200 miles, 68c at 320 miles, 72c at 400 miles, and 78c at 520 miles.

23723. Cement. North American Cement Corp. vs. Central of New Jersey et al. By division 5. Rate, cement, Alsen, N. Y., to Newark Heights, N. J., unreasonable to the extent it exceeded 12.5 c. Reparation awarded.

22020. Cement. Holding that complainants are now practically excluded from the Colorado and Wyoming cement markets by the "present distorted adjustment," the Interstate Commerce Commission, by division 4, in a report written by Commissioner Eastman in No. 22020, Iola Cement Mills Traffic Association et al. vs. A. T. & S. F. et al., has prescribed rates to be

made effective on or before June 5 designed to give complainants an opportunity to sell in the markets mentioned.

Complainants, members of the Iola Cement Mills Traffic Association, make cement at Chanute, Kan.; Dewey, Okla., and Humboldt, Kan. They alleged that the rates on cement from those points and from Fredonia, Iola, Independence and Mildred, Kan., all in the so-called Kansas gas belt, to points in Colorado on and east of the so-called Colorado common-point line extending from the Wyoming border south through Greeley, Denver, Colorado Springs, Pueblo and Trinidad, including Canon City and Golden, Colo., and stations intermediate thereto, and to points in southeastern Wyoming on the Union Pacific east of and including Laramie, and on the Burlington east of and including Cheyenne, were unjust and unreasonable, and, as compared with the state rates on cement to the same destinations from Portland, Concrete and Boettcher, Colo., and Laramie, Wyo., and the interstate rates from Laramie to the Colorado destinations, and from the Colorado points named to the Wyoming destinations, were unduly prejudicial to complainants and unduly preferential of shippers situated at Portland, Concrete, Boettcher and Laramie.

After reviewing contentions of complainants as to unreasonableness of the rates assailed, Commissioner Eastman said a finding of unreasonableness was not warranted by the evidence, and added:

"The principal issue is with respect to the relation between the rates assailed, on the one hand, and the rates from Portland, Boettcher and Laramie, on the other. The intrastate rates from Portland and Boettcher to most of the destinations in Colorado, the interstate rates from Laramie to destinations in Colorado on the Union Pacific, with some exceptions, and the intrastate rates from Laramie to four destinations on the Union Pacific, including Cheyenne, are substantially lower than the scale IV rates for the distances involved, the rates to destinations along the Colorado common point line from Denver south through Pueblo and Trinidad presenting the greatest departures from the scale. For example, the rate from Portland to Denver is 8 cents, whereas for the distance of 142 miles the scale IV rate is 16 cents. It is these departures from the scale IV basis, claimed by complainants to be wholly unwarranted, that are at the bottom of complainants' grievance."

Commissioner Eastman said it was not unusual for carriers to afford producing points far distant from consuming markets some concession in rates in order to permit them to compete in some measure with producing points more favorably situated, although this practice had very generally been abandoned under the Commission's decisions in the case of cement, and with apparent approval of the industry. Here, however, he continued, the situation was just the reverse, for it was the nearby points rather than those far distant that were being given the concession. He said this concession was defended on the ground that it was necessary because of the difficult conditions under which the Colorado and Wyoming plants operated. After further discussion of that phase of the matter, the commissioner said the Commission had insufficient information to enable it to pass on the commercial need for the concession.

"Moreover," said he, "we do not believe that it is our function to pass upon such matters. It is rather our duty to adjust rates fairly to transportation conditions."

In his discussion of the discrimination phase of the case, Commissioner Eastman said the position of the Wyoming mills seemed to be that it was economically unsound for complainants to ship several hundred miles into a comparatively small market when the nearby mills could more than supply the needs of their contiguous territory. On that point he said:

"But it is not our duty to determine what selling policy is economically sound for these mills. Rather it is our duty to see to it that freight rates are fairly adjusted."

The conclusions and findings of the Interstate Commerce Commission follow:

"Although the destination territory in question is in cement scale IV territory, Denver is a much more important point of consumption than most of the destinations in that territory, and the same is true to a lesser extent of the other Colorado common points. On the whole we believe that the establishment of rates from the Colorado and Wyoming mills based on an average of scales III and IV would remove the undue preference and prejudice of which complaint is made. This would result in rates from Portland, Boettcher and Laramie to Denver of 14.5, 11.5 and 15 cents, respectively. And the difference in distance as between Portland and Laramie is sufficiently small so that there is no sufficient reason why defendant the Union Pacific should not make the rate from Laramie 14.5 cents.

"We find that the rates assailed from the complaining points are not unreasonable.

"We further find that the rates on cement in carloads, from Dewey, Okla., and Chanute, Humboldt, Fredonit, Iola, Independence, and Mildred, Kan., to the destination territory hereinbefore described are, and for the future will be, unduly prejudicial to shippers at the above-named origin points, and that the corresponding rates from Portland and Boettcher, Colo., and Laramie, Wyo., to the same destination territory are, and for the future will be unduly preferential of shippers at those points to the extent that the rates from Portland, Boettcher, and Laramie are less than rates based upon the average of cement scales III and IV prescribed in Western Cement Rates (48 I. C. C. 201), subject to a carload minimum weight of 50,000 lb., which rates we find will be just and reasonable for the transportation of the intrastate traffic here involved in the states of Colorado and Wyoming, respectively; provided, however, that the rate from Laramie to Denver, Colo., may be made the same as the rate from Portland to the same destination."

22771. Ground Limestone. In a report written by Commissioner Farrell, in No. 22771, Falling Spring Lime Co., Inc., vs. C. & O. et al., embracing also a sub-number, Same vs. Pennsylvania et al., the Interstate Commerce Commission, by division 5, has prescribed rates and awarded reparation on ground limestone, from Barber, Va., to various destinations, effective on or before May 20, except as to rates from Barber to points in Ohio, Indiana and Illinois which have been found not unreasonable.

In the title complaint the Interstate Commerce Commission found that the rates from Barber, Va., via interstate routes to points in southern classification territory on and north of that part of the line of the Seaboard Air line extending from Jacksonville to River Junction, Fla., had been unjust and unreasonable to the extent that they exceeded rates made by the use of a distance scale set forth in appendix A of the report, plus arbitraries applied exclusively to transportation on short and weak lines, and that complainant was entitled to reparation. For single-line hauls the rates begin with 80 cents a net ton, minimum weight 60,000 lb. for 20 miles, and up to 60 miles 10 cents is added for each 10-mile block. For 80 miles the rate is $1.30, and 10 cents is added for each 20-mile block to 120 miles, at which the rate is $1.50. At 140 miles the rate is $1.65 and at 170 miles, $1.80. At 200 miles the rate is $1.90 and 10 cents is added for each 30-mile block up to 320 miles, at which the rate is $2.30. At 350 miles the rate is $2.40 and 10 cents is added for each 30-mile block up to 470 miles, at which the rate is $2.80. At 500 miles the rate is $2.90 and 10 cents is added for each 40-mile block up to 740 miles, at which the rate is $3.50. The joint-line rates begin with 90 cents for 20 miles and 10 cents is added for each 10-mile block up to 60 miles, at which the rate is $1.30. At 80 miles the joint-line rate is $1.40 and 10 cents is added for each 20-mile block up to 170 miles, at which the rate is $1.80. For 200 miles and over the joint-line rates are the same as the single-line rates heretofore set forth.

23019. Crude Silica Sand. Terre Haute Chamber of Commerce et al. vs. B. & O. et al. By division 3. The rate on crude silica sand, Pacific, Mo., to Terre Haute, Ind., has been found not unduly prejudicial, but was in excess of the aggregate of intermediates and unreasonable in the reparation period covered by the claim of reparation, to the extent it exceeded $2.48 a net ton. Rate assailed found unreasonable for the future to the extent it exceeded or might exceed $1.90 a net ton. Reparation has been awarded to the Highland Iron and Steel Co. New rate to be established not later than June 23.

Application of New Rates on Stone Is Deferred

BY ORDER entered in Docket No. 3571, the Interstate Commerce Commission suspended from February 15, 1931, until September 15, 1931, the operation of schedules proposing to restrict the rates applicable on dolomite, fluxing stone, agricultural limestone and crushed stone, in carloads, between various points in central territory so that they will only apply when loaded in open-top cars, and to apply 60% of sixth class rates when loaded in box cars.

Protest Gravel Rates

MONTEZUMA GRAVEL CO. of Terre Haute, Ind., recently filed complaint with the Interstate Commerce Commission against Baltimore and Ohio and Chicago and Eastern Illinois railroads assailing rates on sand and gravel from Montezuma to points in Illinois and Indiana. Further allegation is that existing rates on sand, gravel and crushed stone unduly prefer competitors at Evansville, Mt. Vernon, Terre Haute and other Indiana points.

Similar complaint has been filed with the Indiana Public Service Commission and joint hearing of two complaints at Indianapolis is requested.

Reduced Rates on Crushed Rock, etc., to California Points

THE railroad commission has vacated its order suspending reduced rates for the transportation of crushed rock, sand and gravel from Radum, Colo., on the Western Pacific railroad, to Woodland, Rio Linda, Rio Oso, Colusa, Marysville, Oroville, Plavo and Chico, Calif., on the Sacramento Northern railway, and to Manteca, Carrolton, Modesto, Turlock and Hilmar, Calif., on the Tidewater and Southern railway, the cause for the suspension having been removed.—*Colusa* (Calif.) *Sun.*

Ed. Shaw's News Letter From Los Angeles

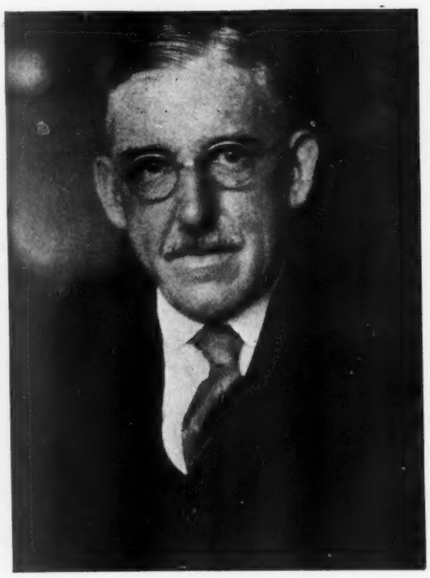
L. F. DE HARPPORTE recently attempted to run a rock and sand plant in Los Angeles county after the county board of supervisors had refused him a permit to do so. He first tried to get a writ of mandamus to compel the board to issue him a permit but the court refused it. Then he started the plant and was arrested and fined $300. His purpose, of course, was to get grounds on which he might ask for an injunction that would restrain the board from interfering with his legitimate business and he claimed that the action of the board and the ordinance under which it acted were unlawful and invalid, first because the effect was to throw the rock and sand business into the hands of a monopoly, and secondly because his plant was so situated that it could not possibly interfere with the health, safety or even the comfort of anyone, so that no ordinance that was based on preserving these things could be valid in this case.

The suit involved many of the things in which we are interested today, legislative control of business, the growth and the social effect of large aggregations of capital, police powers assumed by legislative bodies and so on. It appeared to be worth spending a day in a stuffy court room to hear the arguments on both sides and it was.

The Would-Be Producer's Day in Court

There are two ordinances regulating the sand and rock industry of Los Angeles county (which runs at times to 30,000 tons a day). One is a straight zoning ordinance which forbids the operation of sand and rock plants in certain specified localities. The other is a peculiarly worded ordinance. It says that it shall be unlawful to operate such a plant within one mile of a running stream or a "wash" or within one mile of a public highway or within one-half mile of an inhabited dwelling. There is not a plant in the county that would not have to go out of business if this were all, but the ordinance provides that a plant may be operated almost anywhere except in the zoned districts *provided* that a permit be obtained from the board of supervisors and a license fee of $50 paid. It further provides that when a permit is applied for the board shall set a day for a public hearing when it will hear and consider any objections to the proposed operation.

It seems to be admitted that the board has the power to pass and enforce such an ordinance through the power that has been granted it to regulate industries which may affect the health, safety, morals and the convenience and comfort of the public. The need of some regulatory ordinance is also admitted for even those of us who make a living out of rock and sand plants would not care to have one in the front yard or



Edmund Shaw

even next door. Out here what might be called the zone of nuisance is extended because so much of the product is delivered by truck. If one lives on a highway that is the outlet for a number of plants there is hardly a minute in the day that a great truck, loaded with from six to a dozen tons, is not thundering past. So it is only reasonable that the board should have the regulatory power that it claims.

But it may exercise that power unjustly, and I will have to admit that De Harpporte's attorney made a good showing of proof that it had done so in his client's case. The plant stands in the San Gabriel wash in a locality where there are twelve similar plants already. Its operation could hardly add perceptibly to any nuisance that is already created. And it is admitted that there is no dwelling near enough to be affected.

Some Thought Another Plant Needed

I am sorry that I did not attend the hearing by the board. I am told that protests were made to the board because it was thought that another plant was not needed to supply building material for this locality, and there are several plants not operating there now. It was also shown that competition to reduce price was not needed as the price was admitted to be reasonable. If there were other arguments than these presented the board must not have considered them, as I heard no other reasons for refusing a permit alleged at the trial.

For this reason Attorney Miller, for De Harpporte, claimed the board's action was not only arbitrary and discriminating in favor of a monopoly but was actually illegal in that it deprived his client of property rights without due process of law. He quoted precedents to show that the police powers of a legislative body could not lawfully be exercised where there was no question of an injury to the public safety, morals and convenience.

There should be a word here about the charge that the refusal of a permit favored a monopoly. There are eight companies here whose names I recall at the moment: Rock Products Consolidated, Graham Bros., Blue Diamond, Burden Materials Co., Securities Materials Co., Pavers' Rock Co., Eaton Canyon Rock Co., Mission Rock Co., and there are others run by individuals and smaller companies. The first two sell more than half of all that is sold, but no one company has anything like a complete monopoly. However, it might truly be said that the board's refusal favored the existing producers as against a new comer.

The argument of the defense was that the plaintiff had an opportunity to present his case in the hearing before the board. When he lost there his recourse was to ask for a writ of mandamus. When this was refused him he was simply out of luck, as even the cases cited by the defendant showed that injunctions were not issued where there had been a hearing before refusing a permit.

Judge Withholds Decision

The judge would not decide after hearing the arguments and asked the attorneys to prepare briefs. He was quite right in saying that the case was of great importance from the precedent it might establish.

I had a long talk with Mr. De Harpporte, and his associate, Mr. Joyce, after the trial. He asked how I felt and I told him frankly that I could not see the need of another plant in the San Gabriel wash. There were enough shut-down plants there already.

"'That's all right," he said. "The case is just as bad with filling stations, restaurants, pressing shops and some other businesses. Everyone who comes out here from the East with a little money wants to get in business so all businesses of a local nature are overcrowded. I claim I have just as much right to open another rock plant as another man has to open a new restaurant.

"The American way has always been to let everybody have his chance to go in business. Competition will weed out the unfit, and those who know the game and who are good business men will make money. And if we are not going to have the opportunities to go into business open to everyone we had better adopt the Russian method and have 100% state control.

"I worked hard for that piece of property and paid for it from day's wages. I do not believe that the board of supervisors can

legally take its value away from me. It will not be able to do so if there is justice in our courts."

I get Mr. Harpporte's point of view and I sympathize with him. But I still believe that it would be a mistake to permit another plant to be built, not only in the San Gabriel wash but anywhere else in the United States, where it would be surrounded by so many plants—good, well designed and well built plants—standing idle for want of a market for their products.

Construction Division of Lime Association Has New Chief

EFFECTIVE March 16, Lee S. Trainor became a member of the staff of the National Lime Association in charge of

L. S. Trainor

activities in connection with construction lime.

Mr. Trainor comes from Chicago, Ill., and has had 10 years of experience in association work with the Portland Cement Association, wherein he became acquainted with activities pertaining to building codes, technical societies and general promotional work. During the last two years he has been Chicago district manager for McEverlast, Inc., a Pacific Coast organization with branch office in Chicago.

Company Superintendents Honor Albert L. Worthen

ALBERT L. WORTHEN, vice-president and general manager of the Connecticut Quarries Co., recently elected president of the National Crushed Stone Association, was the recipient of a surprise testimonial dinner on March 9, at the Waverly Inn, Cheshire, Conn. His hosts were the members of the Association of Superintendents of the Connecticut Quarries Co.

Frederick H. Edwards, general superintendent of the company, was toastmaster. Addresses were made by Patrick J. Kelly, president of the Superintendents' Association, and by Otho M. Graves, vice-president and general manager of the General Crushed Stone Co., Easton, Penn., past-president of the National Crushed Stone Association, a guest of honor.

Beg Your Pardon!

SIR: I wish to call your attention to an error in spelling which appeared in my article published in the February 14 issue—"Perchloric Acid for the Determination of Silica in Limestone."

In this article I stated: "The following method of procedure was devised by Carl Price, an analyst of this country." In the article published, the name Price is written Prince. Mr. Price is a conscientious analyst and has devised several unique and interesting methods which we have adopted here. I feel that in all justice to him a note should be made of this in one of your subsequent issues in order that he may get the full credit due him.

CARROLL B. CORE.

Victorville, Calif.,
March 9, 1931.

* * * * *

Sir: On page 68 of the January 31, 1931, issue of your magazine in the writer's report on Texas business (at the National Crushed Stone Association convention) your reporter describes the distance of the straight road in Mexico between Laredo and Monterey as 14 miles straight; the straight portion of that road is slightly over 40 miles without a bend or curve.

MAX A. ALTGELT.

New Braunsfels, Tex.,
February 23, 1931.

Cinder Block Patentees Win Suit

THE Crozier-Straub, Inc., of Philadelphia, Penn., and Syracuse Cinder Products, Inc., have obtained injunctions in United States court against the Paragon Plaster Co. and Syracuse Plaster Co., Inc., Syracuse, N. Y., as part of the terms of settlement of actions charging patent infringement in the making of cinder blocks.

The injunctions were signed by Judge Frank Cooper and restrain the Paragon and Syracuse Plaster corporations from manufacturing and selling cinder blocks in Syracuse and territory within a 15-mile radius.

The amount the Paragon company pays for damages and profits for past infringement is about $7,500 and the Syracuse Plaster Co. agreed in the settlement to pay approximately $2,500.

Francis J. Straub of Philadelphia, Penn., obtained patents for the manufacture of cinder blocks in 1917. The patents passed afterwards to Crozier-Straub, Inc. Syracuse Cinder Products, Inc., obtained rights from Crozier-Straub, Inc., for manufacture of the blocks in the Syracuse territory.

The two actions were brought against the Paragon and Syracuse Plaster companies in United States court several months ago.—*Syracuse* (N. Y.) *Post-Standard.*

Walter Lane Smith

WALTER LANE SMITH, prominent business man and president of the Memphis Stone and Gravel Co., Memphis, Tenn., died March 23, at his home in Memphis, after an illness of several months.

Walter L. Smith

He was one of the earliest and most faithful and earnest workers in the National Sand and Gravel Association, and through his contacts there made a host of friends throughout the country.

Walter Smith will be remembered by his friends as a splendid example of a southern gentleman; as an earnest and sincere friend, and as a business man of exceptional ability and capacity.

He was a native of Birmingham, Ala., where he was born in 1869; graduated at the University of Alabama, and later became secretary and treasurer of a mining company in the Birmingham district. About 1896 he and his brother, C. D. Smith, organized the firm of C. D. Smith and Co., railroad contractors. A section of the New York City subway was constructed by the firm and many railway lines in the South. Later the two organized the Memphis Stone and Gravel Co., of which he was first vice-president and treasurer, and since 1925, president.

States in the Cement Business

A Speech Made by William R. Coyle, of Pennsylvania, in the United States House of Representatives, February 18, 1931

"MR. CHAIRMAN, I desire to call the attention of congress and the country to the results of two experiments in state ownership and operation of cement plants, which are now matters of public record and from which, I feel sure, the advocates of more government in business can take little comfort.

"In presenting these conclusions I speak as one of the representatives of the largest cement-producing districts in the country, the Lehigh Valley of Pennsylvania.

"My interest in this question was aroused because almost every winter when state legislative bodies convene, political agitation appears in some section of the country or other for a publicly owned cement plant.

"Often my colleagues in congress coming from states where such agitation has become pronounced have asked me for information as to the history and economic value of publicly owned cement plants, and until recently I have been able to give them only a general answer. However, for some time past I have been collecting data on this subject, and, after a serious study of this material with the assistance of several trained and responsible accountants, I now submit the results of that study, which I believe to be a complete, impartial, and accurate one.

"There are at present two state-owned cement plants in operation in the United States—one at Chelsea, Mich., and another at Rapid City, S. D.

Michigan State Plant

"The Michigan plant is manned by convict labor. It was leased by the state in 1923. The lease provided for purchase by the state in five years or less and under this provision Michigan became owner of the plant in 1925 at a cost of $500,000 plus inventory of stock and certain minor additions.

"Since state operation started the plant has been a center of controversy and dissension—political and otherwise. It has been variously characterized as "a political football," "a boon to the state," "a white elephant"; and these conflicting opinions forced their way into every political campaign. The quality of cement has been criticized and defended, the price at times has been held excessive and higher than that charged by private manufacturers, the cost of manufacture has been condemned as exorbitant, and the convict-labor principle has been condemned in a continuous barrage of charges and countercharges which have clouded the real facts at issue.

"But there is now little necessity for becoming involved in controversy or figures concerning the Michigan plant. Responsible state officials concede its failure and are casting about for some method of disposing of it. Last year state treasurer Frank McKay submitted to the state administrative board a recommendation that the plant be sold, since the records of his office showed that on July 1, 1930, the plant was $742,295 'in the red'.

"Governor Green, who was then in office, summed up the situation in a statement appearing in the *Detroit Free Press* of July 1, 1930, in which he said:

> The plant cost $500,000 and another $200,000 has been spent. The cost was to have been met by the plant's profits, but there has been nothing but an annual deficit since.

"A more recent editorial in the same newspaper, under the date of January 17, 1931, seems to express the sound opinion of the state. This editorial concludes with the following language:

> The plant has been a 100% liability from the beginning and has cost the taxpayers a good many hundreds of thousands of dollars.
>
> It is not so very many months since Governor Green admitted that the Chelsea cement plant constituted one of the real puzzles of his administration which he has been unable to solve. The legislature is in a different position. It has the power at least, to junk the shebang, write it off as profit and loss, and so prevent further drain.

South Dakota Plant

"The South Dakota experiment is not so unquestionably a failure. Certain of its sponsors and—fairness compels me to admit—many of the citizens of the state still cling to it as of some value. In certain official quarters it is stated that the South Dakota plant has not lost money but, unless the best auditing advice I can secure is inaccurate, this plant has cost the state upwards of $400,000 in losses.

"Before presenting the figures which prove this serious loss a word about the history of the plant seems pertinent. It had its genesis in the Non-Partisan League movement in South Dakota. In 1917 the state legislature authorized the submission to the voters of an amendment to the constitution establishing a state-owned plant. This amendment was carried by a popular vote and a cement commission was appointed and allotted $25,000 to explore materials and investigate sites. A bond issue of $1,000,000 for building and operating the plant was authorized and this issue was later increased to $2,000,000. Construction was begun at Rapid City in 1923 and the plant was in partial production in 1924. In 1925 an additional $275,000 was appropriated to put the plant in operation.

"According to the profit and loss statement issued by the South Dakota State Cement Commission for the period ending June 30, 1930, the plant has earned $668,684.40 since January 1, 1925. Obviously the discrepancy between this claim of substantial profit and my figures deduced from the same official statement showing a loss of $411,977.89 must be accounted for by different methods of bookkeeping and by failure to make depreciation allowances and other charges approved by modern accounting practice and which are recognized as important factors in appraising the success or failure of any carefully regulated industrial enterprise.

"The following table contains a complete schedule of earnings by years from January 1, 1925, to June 30, 1930, with proper deductions made for losses not contained in the balance sheets or the profit and loss statements. These deductions include interest on bonds, insufficient depreciation and loss of taxes—all of which items are fundamental in determining the financial and economic status of a going concern—whether its ownership be private or public.

"These are the figures:

SOUTH DAKOTA STATE CEMENT PLANT—STATEMENT OF LOSSES NOT CONTAINED IN BALANCE SHEET OR SEMIANNUAL PROFIT AND LOSS STATEMENT

Year	Profits shown by state	Insufficient depreciation*	Interest on bonds	Taxes	Loss to state
1925	$ 78,046.55	$ 5,390.50	$102,700.00	$ 40,500.00	$†59,762.95
1926	107,888.63	6,075.26	102,700.00	40,538.24	29,274.35
1927	63,163.70	25,351.59	102,700.00	39,280.07	104,167.96
1928	142,077.65	33,304.66	102,700.00	38,937.71	32,864.72
1929	186,947.60	49,771.79	102,700.00	36,104.34	1,628.53
1930 to June 30	90,560.07	24,141.49	51,350.00	16,947.96	1,879.38
Total	$668,684.20	$121,103.77	$564,850.00	$212,308.32	$229,577.89

*Calculated on basis of 5% annually against depreciated fixed assets. This method of calculating depreciation has been approved for the cement industry by the U. S. Treasury Department.

†Estimated.

In addition to the loss shown above the state has lost the interest on bonds from date of issue to beginning of 1925, the first year of operation.

Loss to state		$229,577.89
This interest amounts to:		
$ 270,000 for 3 years 3 months, at 6%	$ 52,650.00	
1,730,000 for 1 year 6 months, at 5%	129,750.00	
		182,400.00
Total loss		$411,977.89

"By some curious bookkeeping a profit of $90,560.07 was claimed for the first six months of 1930, when a glance at the above table will show an actual loss of $1,879.38 under accepted practices of accounting.

"The financial record of the South Dakota plant stamps as questionable, at least, the business acumen and foresight of the commission first appointed to explore the possibilities of a state-owned plant. Included in the findings of this commission was the following prophetic utterance:

> That with the prospective demand and use of cement in South Dakota within the next five years we are of the opinion that a cement plant located at Rapid City would save the people of the state twice the cost of building the plant.

"It would be the part of charity, perhaps, to dwell no longer on the evaporation of this prophecy and to let the prophets explain how the vision of a $2,000,000 profit transformed itself into the reality of a $411,000 loss.

"In addition to these losses there are other items of expense to be considered which are not entered in the official report of the South Dakota Cement Commission, notably the salaries of state employes whose chief duty is concerned with the production of cement, but whose names are carried on other pay rolls.

"If a further example of the difficulty in successfully administering a publicly owned cement plant is necessary, I might point to the experience of Los Angeles, which, in 1909, began operation of a municipal plant to provide cement for an aqueduct.

"After some years of operation this plant, which cost $890,000, was sold for $450,000, and in the meantime it is estimated that the city paid $1.31 per bbl. more than the price at which it could have purchased cement from private manufacturers.

"I wish to emphasize the fact that the cement manufactured at the South Dakota plant is sold at the market price except in unusual cases. It is sold, moreover, not only in South Dakota but its sale is pressed in adjoining states. This latter imposition involves a phase of government encroachment which has dangerous ramifications and which has been violently condemned by sound economists.

"I do not desire to intrude myself into the increasingly bitter controversy over public versus private ownership, but, in all good faith, I would advise state governments that if they elect to intrude themselves into private enterprises they avoid the cement business, which stands today with an idle capacity of 100,000,000 bbl."

Appointments Announced

THE APPOINTMENT of Dr. Everett P. Partridge, of Ann Arbor, Mich., as supervising engineer of the Non-Metallic Minerals experiment station at New Brunswick, N. J., and of Harold W. Robbins, of Chicago, as editor, is announced by Scott Turner, director of the United States Bureau of Mines, department of commerce.

Alfred B. Botfield

ALFRED BISHTON BOTFIELD, said to be the originator of high temperature cement and founder of that industry in the United States, died recently in Miami, Fla., at the age of 83. He was born September 20, 1847, at Shifnal, Shropshire, England, and received his education in the schools and universities of that country.

Mr. Botfield was originally a manufacturing jeweler in England. Mr. Botfield came to this country in 1899 and established the Botfield Furnace Specialties Co. in Philadelphia, engaging in the building and repairing of stationary and marine boiler settings. He soon recognized the deficiencies of mortars then in vogue for laying up fire brick.

Alfred Bishton Botfield

In 1907, Mr. Botfield produced the first commercial batch of his new bonding material, terming it "Adamant," and it was used for bonding of fire brick in boiler settings at the Continental Dye Works in Philadelphia.

Visioning the market potentialities of high temperature cement in fire brick construction used throughout all industry, Mr. Botfield devoted practically his entire time to the further development and marketing of his pioneer product. Evidence of the accuracy of his vision and foresight is the fact that his original batch of a few hundred pounds of high temperature cement was the forerunner of the many thousands of tons of high temperature refractory cement that are produced annually in the United States at the present time.

In 1915, Mr. Botfield retired from active business, and the conduct of the Botfield Furnace Specialties Co. was assumed by his son, Leonard Bishton Botfield, who is now president of the succeeding Philadelphia concern with the corporate title of Botfield Refractories Co.

Surety Is Released from Obligation to State on Road Bond

A HIGHWAY CONTRACT BOND conditioned upon faithful compliance with the contract and payment for labor and materials used in the performance of the contract has been held by the supreme court of Pennsylvania to be a bond of indemnity and therefore the county, as obligee, may not hold the surety liable for the failure of the principal to pay for certain labor and materials because the county itself is not liable for the payment of such claims. The case was County of Montgomery vs. Ambler-Davis Co. and Metropolitan Casualty Insurance Co.

It was contended by the county, the court pointed out, that it had an insurable interest in the performance by the contractor of his obligations because provision of a fund out of which laborers and materialmen may be paid tends to insure bidding by responsible subcontractors and better performance of their contracts; because the interest of the county and public safety are jeopardized by possible acts of violence growing out of nonpayment of just claims; because it is contrary to sound morals and good policy for the county to accept work and material which is unpaid for, and because the officers of the county owe a duty of protection to the interests of laborers and materialmen.

The court pointed out, however, that the bond merely provided against loss to the county in event some liability on its part arose to those working for and furnishing material to the contractor. A previous decision of the court was cited as authority for the rule that there is no liability on the part of the state and its political subdivisions for the unpaid claims of subcontractors and materialmen.

Utah Cement Manufacturers Hope to Sell Hoover Dam

SEVEN cement companies are situated in freight rate zones which will permit them to bid on cement for the Hoover dam, C. A. Day, president of the Utah-Idaho Portland Cement Co., said recently.

These seven concerns, four in California and three in Utah, he said, are the only ones near enough to the dam site to successfully compete because of freight rates. They are the Southwestern Portland Cement Co., Riverside Portland Cement Co., California Portland Cement Co. and Monolith Portland Cement Co., of California, and the Utah-Idaho Portland Cement Co., Union Portland Cement Co. and Portland Cement Co., of Utah, the latter three Utah concerns.

Utah companies, he explained, are at a disadvantage in the bidding under present conditions because of a differential in freight rates against them. They are hoping for a parity in rates to go into effect before shipping begins, however, he added.—*Ogden* (Utah) *Standard Examiner.*

Portland Cement Output in February

THE PORTLAND CEMENT INDUSTRY in February, 1931, produced 5,920,000 bbl., shipped 5,048,000 bbl. from the mills and had in stock at the end of the month 28,478,000 bbl. Production of portland cement in February, 1931, showed a decrease of 27.5% and shipments a decrease of 28.0% as compared with February, 1930. Portland cement stocks at the mills were 0.8% higher than a year ago.

The statistics here presented are compiled from reports for February, received by the Bureau of Mines from all manufacturing plants except four, for which estimates have been included in lieu of actual returns.

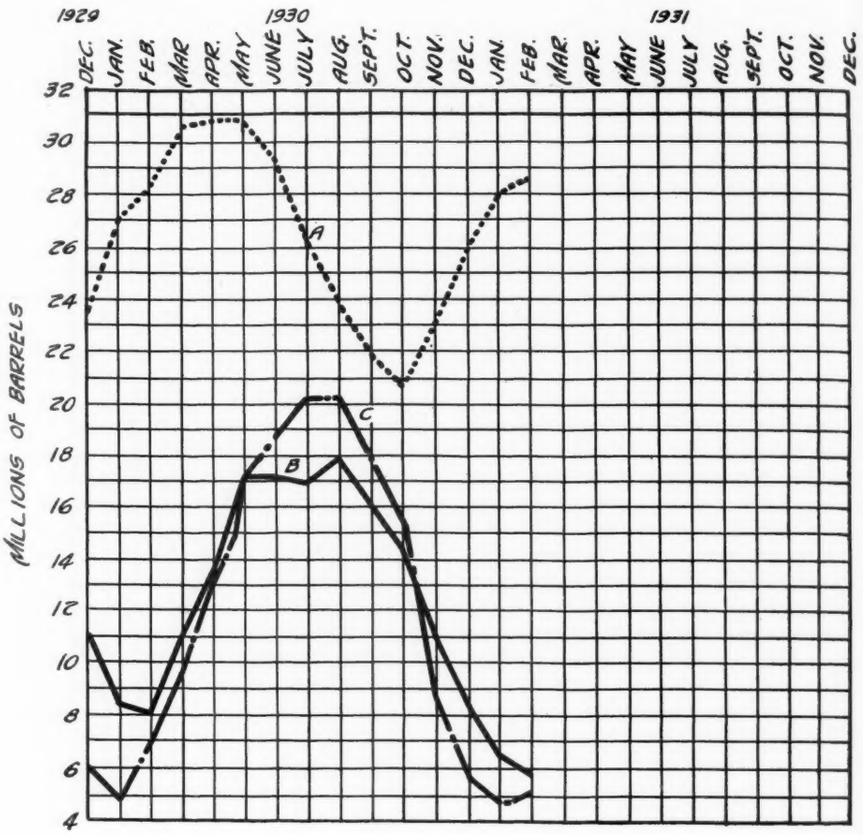
In the following statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 165 plants both at the close of February, 1931, and of February, 1930. The estimates include increased capacity due to extensions and improvements during the period.

RELATION OF PRODUCTION TO CAPACITY

	Feb. 1930 Pct.	Feb. 1931 Pct.	Jan. 1931 Pct.	Dec. 1930 Pct.	Nov. 1930 Pct.
The month	41.5	29.4	29.5	38.2	51.7
12 months ended	65.6	59.7	60.6	61.5	62.6

Distribution of Cement

The following figures show shipments from portland cement mills distributed among the states to which cement was shipped during December, 1929 and 1930, and January, 1930 and 1931:



PORTLAND CEMENT SHIPPED FROM MILLS INTO STATES IN DECEMBER, 1929 AND 1930, AND IN JANUARY, 1930 AND 1931, IN BARRELS*

Shipped to	1929—December	1930—December	1930—January	1931—January
Alabama	115,961	77,946	106,309	88,798
Alaska	962	142	1,590	11
Arizona	46,831	30,171	49,286	36,015
Arkansas	84,761	63,553	43,629	54,904
California	728,509	704,699	†560,052	580,888
Colorado	32,359	19,474	14,818	20,937
Connecticut	62,419	68,997	63,245	40,081
Delaware	11,737	12,883	12,810	10,916
District of Coumbia	44,485	59,861	44,747	53,960
Florida	84,792	60,233	91,344	64,038
Georgia	101,776	86,898	87,956	83,687
Hawaii	19,772	19,770	27,413	24,971
Idaho	6,642	4,829	2,585	4,465
Illinois	263,469	247,845	182,347	195,146
Indiana	108,261	80,190	94,596	79,310
Iowa	35,737	40,965	34,357	30,333
Kansas	105,763	78,186	45,558	70,951
Kentucky	46,660	54,631	32,854	56,581
Louisiana	171,845	130,600	175,009	133,695
Maine	19,014	26,759	14,125	8,263
Maryland	79,751	84,223	80,253	48,532
Massachusetts	101,340	153,583	104,522	106,524
Michigan	224,563	194,610	203,440	174,367
Minnesota	52,991	64,412	59,107	46,987
Mississippi	64,336	32,986	52,518	37,644
Missouri	142,398	188,762	76,507	167,209
Montana	8,041	9,612	6,175	9,502
Nebraska	33,088	21,890	22,811	16,464
Nevada	8,279	1,916	5,452	2,455
New Hampshire	13,915	12,673	9,598	6,586
New Jersey	281,867	259,936	257,563	135,679
New Mexico	10,437	12,929	10,758	12,200
New York	722,146	867,187	681,645	653,705
North Carolina	66,152	42,274	64,998	30,352
North Dakota	2,161	2,352	2,787	2,737
Ohio	253,060	238,538	243,570	188,631
Oklahoma	213,739	135,784	99,486	115,140
Oregon	49,698	53,936	25,776	31,862
Pennsylvania	435,580	431,241	442,728	323,776
Porto Rico	4,500	6,918	1,750	620
Rhode Island	24,096	20,270	22,295	13,249
South Carolina	67,813	132,992	44,806	170,545
South Dakota	12,744	7,187	11,204	6,533
Tennessee	136,191	74,077	85,912	65,246
Texas	428,688	339,964	299,248	327,904
Utah	23,560	4,271	12,529	6,075
Vermont	17,560	2,678	21,257	2,869
Virginia	68,406	77,370	71,683	61,804
Washington	101,062	185,135	47,785	110,948
West Virginia	50,471	56,245	48,025	52,512
Wisconsin	80,278	62,793	77,039	66,531
Wyoming	6,690	3,028	2,755	4,854
Unspecified	.....	427	8,760	25,367
	5,877,356	5,650,831	†4,889,372	4,663,359
Foreign countries	73,644	37,169	†65,628	23,641
Total shipped from cement plants	5,951,000	5,688,000	4,955,000	4,687,000

*Includes estimated distribution of shipments from three plants in December, 1929; from two plants in December and January, 1930; from four plants in January, 1931.
†Revised.

PRODUCTION AND STOCKS OF CLINKER BY MONTHS, IN 1930 AND 1931, IN BARRELS

Month	1930—Production	1931—Production	Stocks at end of month 1930	Stocks at end of month 1931
January	10,504,000	8,129,000	9,646,000	*10,384,000
February	10,008,000	7,473,000	11,572,000	11,952,000
March	13,045,000	.....	13,503,000	.....
April	15,025,000	.....	15,164,000	.....
May	16,607,000	.....	14,668,000	.....
June	15,895,000	.....	13,452,000	.....
July	15,069,000	.....	11,684,000	.....
August	15,244,000	.....	9,275,000	.....
September	14,577,000	.....	7,783,000	.....
October	13,895,000	.....	7,266,000	.....
November	11,639,000	.....	7,758,000	.....
December	9,484,000	.....	8,809,000	.....

*Revised.

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY DISTRICTS, IN FEBRUARY, 1930 AND 1931, AND STOCKS IN JANUARY, 1931, IN BARRELS

District	Production 1930—Feb.—1931		Shipments 1930—Feb.—1931		Stocks at end of month 1930	1931	Stocks at end of Jan., 1931*
Eastern Penn., N. J., Md.	2,033,000	1,630,000	1,419,000	1,123,000	6,689,000	6,054,000	5,546,000
New York and Maine	187,000	151,000	257,000	182,000	1,556,000	1,957,000	1,988,000
Ohio, Western Penn., W. Va.	762,000	412,000	651,000	415,000	3,401,000	3,705,000	3,709,000
Michigan	543,000	109,000	297,000	220,000	2,761,000	2,804,000	2,915,000
Wis., Ill., Ind. and Ky.	883,000	427,000	664,000	416,000	4,145,000	3,966,000	3,955,000
Va., Tenn., Ala., Ga., Fla., La.	727,000	836,000	881,000	768,000	1,598,000	1,833,000	1,765,000
East'n Mo., Ia., Minn., S.D.	748,000	766,000	492,000	377,000	3,396,000	3,458,000	3,069,000
West'n Mo., Neb., Kansas, Okla. and Ark.	709,000	263,000	764,000	377,000	1,834,000	1,952,000	2,066,000
Texas	482,000	286,000	521,000	328,000	778,000	740,000	782,000
Colo., Mont., Utah, Wyo., Ida.	130,000	160,000	104,000	82,000	441,000	488,000	410,000
California	755,000	709,000	793,000	602,000	1,131,000	938,000	831,000
Oregon and Washington	203,000	171,000	169,000	158,000	519,000	583,000	570,000
	8,162,000	5,920,000	7,012,000	5,048,000	28,249,000	28,478,000	27,606,000

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY MONTHS, IN 1930 AND 1931, IN BARRELS

Month	1930—Production—1931		1930—Shipments—1931		Stocks at end of month 1930	1931
January	8,498,000	*6,595,000	4,955,000	*4,692,000	27,081,000	*27,606,000
February	8,162,000	5,920,000	7,012,000	5,048,000	28,249,000	28,478,000
March	11,225,000	.....	8,826,000	.....	30,648,000	.....
April	13,521,000	.....	13,340,000	.....	30,867,000	.....
May	17,249,000	.....	17,224,000	.....	30,891,000	.....
June	17,239,000	.....	18,781,000	.....	29,364,000	.....
July	17,078,000	.....	20,153,000	.....	26,289,000	.....
August	17,821,000	.....	20,299,000	.....	23,824,000	.....
September	16,124,000	.....	18,083,000	.....	21,889,000	.....
October	14,410,000	.....	15,599,000	.....	20,697,000	.....
November	11,098,000	.....	8,784,000	.....	23,056,000	.....
December	8,480,000	.....	5,688,000	.....	25,883,000	.....
	160,905,000	.....	158,744,000	.....	.....	.....

PRODUCTION AND STOCKS OF CLINKER (UNGROUND CEMENT), BY DISTRICTS, IN FEBRUARY, 1930 AND 1931, IN BARRELS

District	1930—Production—1931		Stocks at end of month 1930	1931
Eastern Pennsylvania, New Jersey and Maryland	2,415,000	1,947,000	1,785,000	1,665,000
New York and Maine	344,000	326,000	970,000	1,078,000
Ohio, Western Pennsylvania and West Virginia	1,041,000	580,000	1,496,000	1,465,000
Michigan	758,000	380,000	1,371,000	1,542,000
Wisconsin, Illinois, Indiana and Kentucky	1,539,000	891,000	1,511,000	1,558,000
Virginia, Tennessee, Alabama, Georgia, Florida, Louisiana	758,000	749,000	770,000	872,000
Eastern Missouri, Iowa, Minnesota and South Dakota	893,000	896,000	728,000	727,000
Western Missouri, Nebraska, Kansas, Oklahoma, Arkansas	796,000	388,000	383,000	791,000
Texas	451,000	292,000	536,000	348,000
Colorado, Montana, Utah, Wyoming and Idaho	135,000	160,000	258,000	276,000
California	701,000	706,000	1,261,000	1,146,000
Oregon and Washington	177,000	158,000	503,000	484,000
	10,008,000	7,473,000	11,572,000	11,952,000

EXPORTS AND IMPORTS OF HYDRAULIC CEMENT, BY MONTHS, IN 1930 AND 1931

Month	1930——Exports——1931 Barrels	Value	Barrels	Value	1930——Imports——1931 Barrels	Value	Barrels	Value
January	82,387	$293,135	41,199	$115,678	201,609	$207,461	‡97,057	‡$132,937
February	64,267	217,798	.....	.....	114,455	119,717	.....	.....
March	117,563	357,896	.....	.....	43,622	59,981	.....	.....
April	57,419	200,217	.....	.....	140,871	178,226	.....	.....
May	57,423	198,170	.....	.....	94,696	111,998	.....	.....
June	82,077	223,639	.....	.....	55,356	74,370	.....	.....
July	47,082	166,577	.....	.....	12,404	20,973	.....	.....
August	49,031	167,579	.....	.....	35,323	39,029	.....	.....
September	46,594	153,384	.....	.....	51,096	59,721	.....	.....
October	62,690	190,305	.....	.....	75,284	84,364	.....	.....
November	50,495	151,555	.....	.....	109,124	125,448	.....	.....
December	38,680	134,260	.....	.....	44,157	59,641	.....	.....
	755,708	$2,454,515	.....	.....	977,997	$1,140,929	.....	.....

Exports and Imports†*

Compiled from the records of the Bureau of Foreign and Domestic Commerce and subject to revision.

EXPORTS OF HYDRAULIC CEMENT BY COUNTRIES, IN JANUARY, 1931

Exported to	Barrels	Value
Canada	1,692	$ 7,977
Central America	14,207	29,643
Cuba	3,310	6,878
Other West Indies	997	2,439
Mexico	2,609	7,359
South America	16,215	48,654
Other countries	2,169	12,728
	41,199	$115,678

IMPORTS OF HYDRAULIC CEMENT BY COUNTRIES AND BY DISTRICTS, IN JANUARY, 1931

Imported from	District into which imported	Barrels	Value
Belgium	Massachusetts	15,138	$27,000
	New York	19,047	21,549
	Porto Rico	1,011	1,850
	Total	35,196	$50,399
Canada	Maine & N. H.	63	$ 183
	Porto Rico	1,011	1,130
	Total	1,074	$ 1,313
Denmark	Porto Rico	30,419	$40,012
	Utah-Nevada	1,055	1,900
	Total	31,474	$41,912
France‡	New York‡	1,942	$ 4,219
Germany	Los Angeles	1,005	$ 1,966
Japan	Hawaii	8,300	$ 8,481
United K'gd'm	New York	18,066	$24,647
	Grand total‡	97,057	$132,937

DOMESTIC HYDRAULIC CEMENT SHIPPED TO ALASKA, HAWAII AND PORTO RICO, IN JANUARY, 1931

	Barrels	Value
Alaska	200	$ 591
Hawaii	18,429	47,414
Porto Rico	720	1,568
	19,349	$49,573

*The value of exports of domestic cement is the actual cost at the time of exportation in the ports of the United States whence they are exported, as declared by the shippers on the export declarations.

†The value of imported cement represents the foreign market value at the time of exportation to the United States.

‡Includes 1449 bbl. white non-staining portland cement, valued at $3295.

Building Material Prices

THE figures given below, compiled by the Department of Commerce, show average prices paid March 1 by contractors, delivered.

City	Portland cement, per bbl. exclu. of cont.	Gypsum wallboard, ⅜-in., per M	Hydrated lime, per ton	Building sand, per cu. yd.	Crushed stone, ¾-in., per ton	Gypsum plaster, neat, per ton
New Haven, Conn.	$2.90	.....	$20.00	$1.25	$2.25	.....
New London, Conn.	2.80	$25.00	26.00	1.50	2.40	$18.00
Waterbury, Conn.	3.00	30.00	20.00	1.35	2.45	20.00
Haverhill, Mass.	2.80	25.00	20.00	.....	.....	18.50
New Bedford, Mass.	2.65	27.00	18.50	1.75	3.00	17.50
Albany, N. Y.	2.97	24.75	18.00	.....	.....	17.10
Buffalo, N. Y.	2.95	21.00	18.00	2.50	2.05	16.00
Poughkeepsie, N. Y.	2.18	.....	.....	2.25	2.00	.....
Rochester, N. Y.	3.25	22.00	20.00	1.75	2.40	17.00
Paterson, N. J.	2.40	25.00	18.00	1.50	2.10	17.50
Trenton, N. J.	2.40	26.00	18.00	1.50	2.10	17.50
Philadelphia, Penn.	2.30	.....	14.50	1.75	2.60	17.50
Scranton, Penn.	2.80	.....	20.00	3.25	.....	19.00
Baltimore, Md.	2.40	.....	13.50	2.50	2.75	15.00
Washington, D. C.	2.33	25.00	13.00	.....	.....	20.00
Richmond, Va.	3.10	31.00	17.50	1.95	2.45	20.00
Fairmont, W. Va.	2.80	35.00	16.00	3.15	3.50	18.00
Columbia, S. C.	2.35	35.00	12.00	1.50	2.75	14.40
Atlanta, Ga.	2.85	.....	17.50	3.38	3.25	19.00
Tampa, Fla.	3.00	.....	24.00	1.50	4.00	.....
New Orleans, La.	2.20	.....	.....	2.35	.....	18.00
Shreveport, La.	3.20	.....	.....	2.00	4.75	22.00
Erie, Penn.	2.40	22.50	19.00	2.00	.....	16.00
Akron, Ohio	2.67	.....	18.00	1.85	1.85	.....
Canton, Ohio	2.95	.....	16.00	2.50	3.00	15.00

City	Portland cement, per bbl. exclu. of cont.	Gypsum wallboard, ⅜-in., per M	Hydrated lime, per ton	Building sand, per cu. yd.	Crushed stone, ¾-in., per ton	Gypsum plaster, neat, per ton
Cincinnati, Ohio	$2.94	$24.75	$14.40	$2.63	$2.55	.....
Cleveland, Ohio	2.40	22.00	12.00	1.95	2.70	$14.50
Columbus, Ohio	2.70	.....	14.00	.....	2.25	15.00
Toledo, Ohio	3.00	20.00	12.00	2.00	2.50	14.50
Youngstown, Ohio	2.60	.....	15.00	3.40	2.50	15.00
Detroit, Mich.	2.60	25.00	14.80	2.03	1.95	.....
Lansing, Mich.	2.90	.....	22.00	2.20	.....	16.50
Saginaw, Mich.	2.60	25.00	18.00	2.50	3.25	17.00
Terre Haute, Ind.	2.85	28.00	18.00	1.65	3.25	18.00
Louisville, Ky.	2.52	.....	15.50	2.20	2.43	16.00
Chicago, Ill.	2.40	21.00	17.00	2.00	2.00	16.00
Rockford, Ill.	2.90	25.00	20.00	1.60	1.15	16.00
Milwaukee, Wis.	2.20	25.00	15.00	1.50	1.50	.....
Des Moines, Iowa	3.08	.....	20.00	1.10	.....	.....
Kansas City, Mo.	2.50	25.00	.....	1.70	2.25	17.00
St. Louis, Mo.	2.15	.....	18.00	1.35	1.00	18.00
St. Paul, Minn.	2.45	.....	18.00	2.23	1.75	18.00
Grand Forks, N. D.	3.00	.....	25.00	2.60	.....	20.00
Sioux Falls, S. D.	3.00	.....	24.00	1.25	2.25	15.00
San Antonio, Texas	2.60	.....	20.00	2.25	2.35	19.15
Tucson, Ariz.	3.37	.....	30.00	1.25	2.25	17.70
Denver, Colo.	2.20	.....	22.00	1.35	1.50	18.00
Los Angeles, Calif.	2.30	.....	28.50	1.85	1.90	15.20
San Francisco, Calif.	2.42	.....	22.50	1.40	1.60	19.90
Seattle, Wash.	1.75	.....	22.00	1.40	1.90	20.00

Construction Materials Corp. Plans Expansion

IMPORTANT EXPANSION and development is being put through by Construction Materials Corp., Chicago, Ill., it is announced by J. R. Sensibar, president of the company, whose operations extend to Cleveland and the Great Lakes district.

Program involving more than $3,000,000 calls for enlarging capacity of company's sand and gravel grading plant at Ferrysburg, Mich., inauguration of extensive research activities, acquisition of docks and other measures.

Recently the company launched a new flagship, making its fleet of lake vessels designed for dredging, filling and conveying the largest on the lakes. It is understood that Cleveland, Ohio, bankers will handle some financing incidental to this expansion program.

Company has grown from a small sand and gravel and trucking business to a dominant position in three important fields and is one of America's industrial romances. It was founded in 1906 by a youthful teamster who sensed the possibilities of his job, and who still is head of the business.

The lines in which the corporation is engaged include the production and sale of sand and gravel for construction and paving purposes, operation of a fleet of lake vessels for conveying sand and gravel and for sand filling and paving and road building.

The plant addition at Ferrysburg, Mich., will give the company the largest producing capacity of sand and gravel on the Great Lakes. Output will be increased by 500,000 tons annually to 2,000,000 tons.

The sand filling division business of the company is an important activity because of the needs for water front development along the Great Lakes. The company's equipment is also available for this work on the Atlantic coast and the Gulf of Mexico.

The new flagship of the fleet recently constructed by the American Shipbuilding Co. is a steam turbine electric driven boat, 550 ft. long and 10,000-ton capacity. This boat can discharge wet or dry cargo at the rate of 4500 tons per hour and pump sand four miles through a pipe line. The new boat has increased the company's potential lake carrying capacity from 1,500,000 cu. yd. to about 3,500,000 cu. yd.—*Cleveland* (Ohio) *Plain Dealer.*

New Gravel Plant in Iowa Ready to Operate

THE Iowa Falls Sand and Gravel Co., Iowa Falls, Iowa, owned by local men, will go into operation about April 1, it was announced recently.

The company has over 3000 ft. of siding just southeast of the city. New equipment is being installed.

The plant will have a capacity of 1000 tons. —*Marshalltown* (Ia.) *Times-Republican.*

Plant Superintendent Arrested in Long Island Sand and Gravel War

WILLIAM J. LEACH, superintendent of O'Brien Bros. Sand and Gravel Co., Port Jefferson, L. I., N. Y., was arrested Saturday, February 28, for violating Belle Terre Ordinance No. 1, prohibiting the mining of sand and gravel within the corporate limits of the Village of Belle Terre. The Belle Terre officer, Julius Jensen, made the arrest. Mr. Leach was taken before police justice Bayard L. Peck, in this test case, which is hoped to determine once and for all the rights of the gravel company to mine sand and gravel within the limits of Belle Terre. The defendant pleaded not guilty, as he doubts the validity of the ordinance prohibiting the mining of sand and gravel.—*Port Jefferson* (N. Y.) *Echo.*

Nebraska Sand Producer Sues Railway for Switching Facilities

THE Schellberg Sand and Gravel Co. has filed a complaint with the state railway commission asking that the Union Pacific railroad be required to furnish sidetrack connections to land owned by the complainant 1½ miles west of Fremont, Neb.

The company charges that switching privileges were always granted by the Union Pacific west of Fremont farther than complainant's land is located but that when the complainant purchased this land the Union Pacific refused switching to protect a competitor of the gravel company.

Nebraska Sand Producer Expanding Operations

THE George W. Bell Co., of Omaha, Neb., which maintains sand and gravel pits just north of Plattsmouth, Neb., near highway No. 75, is making preparation for a busy season, and has in the slack months been organizing its plant to handle a large volume of business.

The company has in the past few months had a fleet of trucks overhauled and placed back in service.

The Smith Bros., of Fort Worth, Tex., who have been engaged in pipeline construction work for the past year, have been secured by the company to strip off a large section of the grounds at the pit where additional gravel is located and which will be tapped this year by the Bell company.

The company has started the pumping of gravel for the season, a great deal of the sand and gravel being used in work in Omaha, the company having two contracts for material, one of these being in the new Central high school building and other public works at that place.—*Plattsmouth* (Neb.) *Journal.*

Northwest Sand and Gravel Producer Expanding

IMPROVEMENTS AND EXTENSIONS to Tru-Mix concrete plants, costing approximately $250,000 are to be made in the near future, by the Pioneer Sand and Gravel Co., Seattle, Wash., according to D. L. Williams, vice-president and general manager.

This program includes rebuilding and relocating the present Westlake plant and increasing its capacity 20%. The new location will be on Waterway No. 6, on Fairview Avenue, adjacent to the new general materials warehouse now operated by the company. This work is already under way.

The present Latona plant is being moved to the company's property on Northlake Avenue at Waterway No. 16, modernized and doubled in capacity.

The Spokane street plant will be doubled in capacity and modernized in several respects.

The total capacity will be increased 50% and operating costs will be considerably reduced by more efficient aggregate handling equipment, and bulk cement handling.

Mr. Williams also pointed out that the new arrangement will provide facilities for handling eight different grades, or sizes, of aggregate, the effect being, he said, "to permit perfect grading of materials in a batch.

"We believe that in doing this Tru-Mix will be the first commercial mixed concrete business in the country to establish positive theoretical gradings. This will be done by the proportioning by accumulative weighing of each batch two or three grades of gravel and two grades of sand. Variations in grading for particular conditions will be possible. The major aggregate sizes will be carried as stock material in ⅜-in., ⅞-in., 1½-in. and 3-in., and three different sand grades will be carried over each mixer."

The general plant design consists of one or more units, depending upon the locations, each unit to be a 2-cu. yd. mixer set under a bin having a capacity of 1000 cu. yd. Such bins will also be equipped for truck loading of dry material, either in batch or volume load.—*Seattle* (Wash.) *Pacific Builder and Engineer.*

Orders Placed for 20-In. Gravel Pumps

THE Westinghouse Electric & Manufacturing Co. has received two orders for large turbine-driven dredge pumps and auxiliary equipment from O'Brien Bros. Sand and Gravel Corp. of New York and Leatham D. Smith Dock Co. of Chicago. The former purchased two 20-in. hydraulic dredge pumps, each driven by a 550-hp. geared turbine, while the latter placed an order for a 1200-hp. geared turbine and a hydraulic dredge pump rated at 31,000 gal. per min.

Accident Prevention Work at the Plant of the Great Lakes Portland Cement Corp.

By J. B. Zook
Chief Engineer and Safety Director

IN ORGANIZING our campaign against accidents and for the promotion of safety ideals among the employes of the Great Lakes Portland Cement Corp., we established the following corollaries as a basis for this work:

(1) That the company must assume the responsibility of providing guards and all possible protection from physical hazards.

(2) That an efficient first-aid organization must be maintained in order to provide prompt and proper care of the injured, thereby reducing accident results to a minimum.

(3) That those engaged in a supervisory capacity must be of high standard and heartily in accord with the accident prevention policies of the company.

(4) That properly planned education in safety work, ideals and conduct must be maintained.

(5) That competition as an incentive and means of keeping interest alive in this work should be encouraged.

(6) That a comprehensive and adequate system of records and reports of accidents and all the details connected therewith must be kept and used as a means for proper analysis of these accidents, prevention of their repetition and elimination of hazards whenever found.

In placing the responsibility of the company first, the thought was that by setting up the proper example of making the plant a safe place in which to work, the men would be more or less imbued with the spirit of protecting themselves. It was also thought that it would be difficult to teach the gospel of safety in their work around machinery which was not properly guarded. In the purchase of additional or new equipment, the matter of its being properly safeguarded is one of the primary requisites.

J. B. Zook

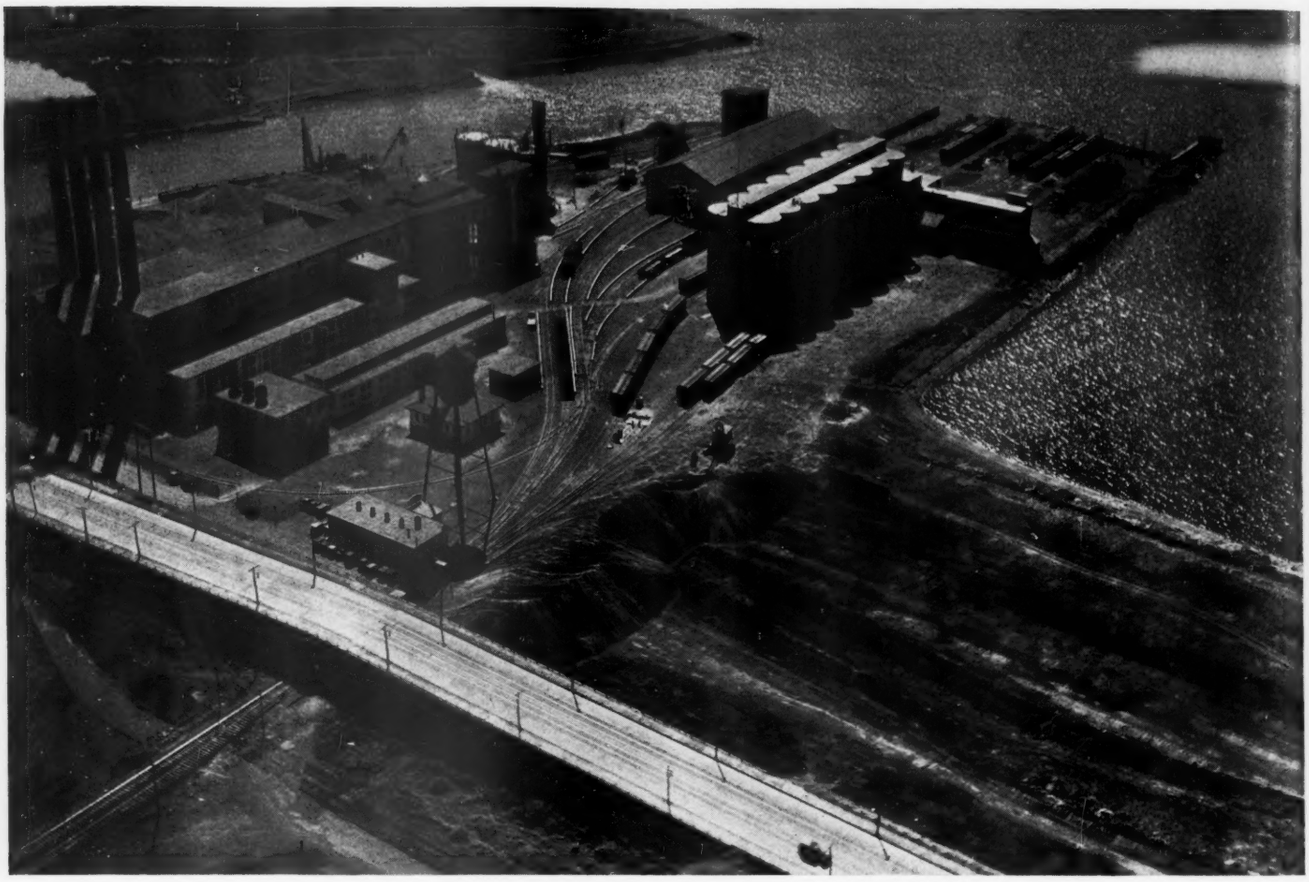
The maintenance of an efficient first-aid room in charge of a registered nurse has proved its value in many ways. Every employe of the company is given a thorough physical examination, an accurate record of which is kept. Should serious defects be found through this examination, the man is advised thereof and an endeavor is made to find the proper kind of work so his disability will not be aggravated or prove a handicap to him. Very often the man is advised of things of which he had no idea and he is able to go to his physician, have his trouble corrected and thus become more valuable to himself and his family as well as to the company. No man can put forth his best efforts if he is sick physically or mentally, and many serious accidents have been traced directly to these causes. Employes are permitted to apply to the first-aid room for any advice and help they may need for maintaining their health. A careful record is kept of these visits and if they become too regular the employe is advised to see his physician or definite arrangements are made whereby be may be otherwise taken care of. Included in the duties of the nurse are visits to the sick and this practice has served a twofold purpose, i.e., that of reducing needless layoffs from work and that of impressing the man with the interest which the company takes in his welfare.

Care in Fitting Goggles

Goggles are fitted to each individual employe so not only are his eyes protected but the goggles are made comfortable and do not tire his eyes nor hurt his face. We have found that if a man is properly fitted with the correct type and shape of goggle, a great deal of the aversion toward their use is overcome. Each man has his own goggles and their use has come to be accepted as part of the working uniform, or a necessary adjunct thereof.

The actual burden of responsibility for the success or failure of accident prevention work, of course, rests with the men engaged in the supervision of others, i.e., the foremen. If these men are to be given this responsibility, quite naturally they must have proper qualifications to receive it. They

Several points of interest in the first-aid room at the plant of Great Lakes Portland Cement Corp., Buffalo, N. Y.



General view of Great Lakes plant taken from the air

must merit the respect and obedience of the men with whom they must come in contact. They must exemplify the doctrines which they preach. They must know their job and understand the limitations and abilities of their men. They must be able to act on their own initiative, yet not be afraid to ask the advice or co-operation of others. They must be leaders, not pushers.

Through the medium of safety committee meetings and regular inspections, these men control the work of accident prevention. Regular meetings of these leaders are held twice monthly in which they get together and discuss the safety work for the future as well as analyze the results of past endeavors. Prior to each meeting, an inspection committee makes a thorough inspection of the plant and reports its findings at the meeting in which all members of the general safety committee are present. Their report is investigated by the general committee and also by a special investigating committee and if the recommendations are approved they are carried out as ordered. We have found that this authority is not misplaced nor is it often violated.

In 1927 there were 69 recommendations made and 61 completed; in 1928 there were 70 recommendations made and 70 completed; in 1929 there were 144 recommendations made and 142 of them were completed, and in the first 11 months of the year 1930 there were 60 recommendations made and 51 completed, some being still in the process of completion. In attending the committee meetings each regular member brings one of the members of his particular group or department in order that he may see some of the workings of the safety organization and feel that his co-operation is also necessary. Many of our best safety suggestions have come from these men who actually do the work and know the hazards as they are. The fire committee makes regular inspections of the fire apparatus every two weeks and reports at the committee meetings the condition in which the apparatus is found. The personnel of the inspection committee is changed every three months in order that as many men as possible may have an opportunity to serve on it.

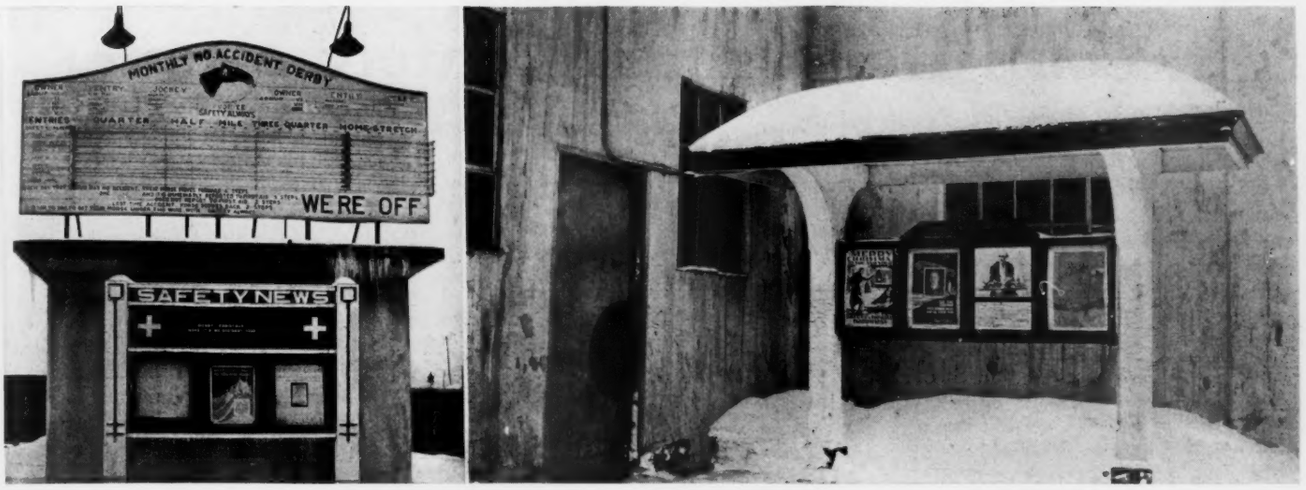
It has been stated by those with years of experience in the work of accident prevention that 80% of safety work is in education; and recognizing this, we have taken advantage of every opportunity and facility to make our employes safety-minded. Men whose minds have been stimulated and guided to thoughtfulness for their own safety and that of others, their families, their responsibilities to the community and the realization of the value of a perfect body as a means of earning a livelihood are habitually careful and think far enough ahead to recognize dangerous practices and avoid them.

Through the co-operation of the various department heads, all of whom are experienced men in their own lines, we have written up a little book of rules and regulations, one of which is given each man as he enters the employ of the company. This little book is given out as a guide for his conduct and is intended to equip him with as much as possible of the experience of the men who have spent years in the cement business and start him out with a general idea of what is expected of him.

Personal Talks to New Men

The safety director meets each man as he enters the employ of the company and has a little personal talk with him to explain the plant organization, its ideals, principles and standards. First impressions are often the most lasting and may have a great deal to do with the future actions of the new employe and his attitude toward the company or his foreman. He is told, first of all, that his fellow-workers are *safe workmen* and that there is no room for anyone who is not. Two central bulletin boards are maintained and supplied with new and up-to-date material so that interest is always kept alive in them.

Each department has its own bulletin board and material is changed on these boards every week in addition to the matters of interest to that department only. The well



General safety bulletin board, monthly no-accident derby board, and main bulletin board

regulated bulletin board is one of the most effective means of education. In addition to the safety messages, campaigns against waste, tardiness and poor workmanship and for self improvement, better quality products and co-operation have been put over.

Competition is provided through the medium of a monthly no-accident derby. The plant personnel is divided into seven groups for this purpose and to each group is assigned a leader who is directly responsible for the men in his group. Cash bonuses are awarded to the groups finishing the month with perfect records. When this contest was first started the winners each month continued the competition until one of them eliminated the others tied with it, but we found that more interest was maintained in the contest if it were decided each month instead of dragging along. By deciding the winners each month and awarding the prizes to all perfect groups, the beginning of each month found the groups all on an equal basis and having a fresh start for their endeavors that month. There is no question of the unpopularity of the man who spoils the record of his group. He's in wrong, that's all! We believe that this monthly no-accident derby of ours has been an important factor in achieving the results we have had.

Records and reports are of course necessary that we may be able to analyze our accident experience, look for the weak places in our organization, our machinery, equipment and methods of work. We are able to determine whether we are doing better or getting worse; we know which hazards we are most susceptible to; we find out whether it is the new men or the old employes that have been having the accidents, whether in the morning or evening, early in the week or at the end of the week. All of these points have an important bearing on the elimination of accidents and careful study and analysis by the safety director as the records are made enables him at all times to regulate his program to strengthen the weak places.

Fear Banished from Minds of Workmen

Our conclusions are that by proper guarding and elimination of hazards we have banished fear from the minds of the workmen and provided them with the foundations of safe practice; by maintaining an efficient first-aid department, and using it, we have provided a service to the employe and counteracted the dangers of infection; by example and instruction our foremen have built up a morale among the men by means of which safe workmanship is devoutly practiced, and the committee meetings are but a means to this end; that continual and everlasting education is the backbone of our campaign against accidents. The men begin to think and become safety-minded.

To provide the necessary amount of interest and enthusiasm to the work, some sort of competition is needed. We have competition in sports, in business and other activities, so why not competition in safety and accident prevention? Direct incentives bring the best results.

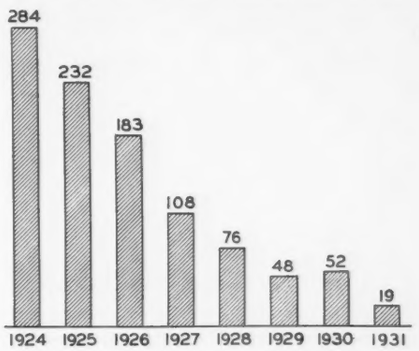
To Adam L. Beck, president of the Great Lakes Portland Cement Corp., who has always been so generous with his support and advice, we are heartily grateful. His leadership and hearty co-operation have made possible the success we have attained in our safety work.

February Accidents in the Cement Industry

THE ACCOMPANYING CURVE shows at a glance the unusually good showing with respect to safety made by the cement mills and quarries in Portland Cement Association membership during the month of February.

Of the 19 accidents recorded, 16 involved loss of time only, one permanent disability with loss of time and two fatal termination. While the lost-time accidents show a large reduction in number and in severity as well, the permanent disability accident cost an eye. There were the same number of fatalities suffered as during February, 1930.

One of the fatal accidents occurred in the finishing department, when an electrician who was making an inspection fell 44 in. into an uncovered elevator pit. The ninth rib was fractured in two places. While in his weakened condition pneumonia developed with fatal results. The accident was caused by a laborer who had neglected to replace walkway plates after cleaning out the pit.



February accidents show gratifying decrease from former years

The second fatal accident of the month occurred in a quarry. A jackhammer operator was located on a 40-ft. ledge, doing mucking, preparing to drill holes. Loose stone started to slide and the employe fell off the ledge, landing on a rock about 15 ft. below, sustaining a fracture of the skull.

Poor Housekeeping

Poor housekeeping seems to be to blame for the accident which cost a repairman his eye. The victim of the mishap was engaged on a construction job in the burning department when a bar fell from the top of the dust chamber, striking him in the face. According to the reports, the bar had been carelessly thrown down close to the edge of the structure where it apparently vibrated off. This is an exceedingly difficult type of accident to foresee and guard against.

St. Louis Holds Annual Safety Meeting

Cement Mills of Eastern Missouri Have Enthusiastic Turnout

ON Tuesday, February 24, the member cement plants of the Portland Cement Association in eastern Missouri held their second annual safety meeting at the Coronado hotel, St. Louis. The plants represented were the plant of the Alpha Portland Cement Co. at Jefferson Barracks, the two mills of the Missouri Portland Cement Co. at Prospect Hill, and the two mills of the Universal Atlas Cement Co. at Hannibal. F. R. Loveridge, superintendent of the local Alpha plant, acted as chairman.

In opening the convention, Mr. Loveridge, after a few introductory remarks, introduced A. J. R. Curtis, assistant to the general manager, Portland Cement Association, who spoke on the topic, "Where Are We Going in Accident Prevention?" Mr. Curtis reviewed some of the work which has been done in so successfully eliminating accidents from cement mills and outlined the activities which will be taken up in the immediate future.

The larger part of the morning session was devoted to three papers by active safety men from three of the plants in the district, followed by discussion of the points which they brought up. The first paper was prepared by W. W. Hamilton, general safety director of the St. Louis plant of the Alpha Portland Cement Co., and read by E. G. Hammer, safety engineer of that plant. The general subject assigned to these speakers was, "The Most Effective New Idea Used by Our Plant to Prevent Accidents During 1930."

"Just Team Work"

Mr. Hamilton's paper stated frankly that there was nothing new nor spectacular done at his plant during the year in the way of accident prevention, as the steady improvement made by his company was not the result of any one specific thing but of the application of all the known principles which underlie success in safety work or in any venture. He likened it to the success of the Notre Dame football team, which was not due to any trick plays unknown to their opponents nor to any superhuman knowledge of the game. The one thing which gave them their place in football was co-operation, the ability to forget oneself and work for a common cause which, after all, is a broad principle applicable to almost anything. Regarding his own specific problem, he said:

"The officers of the Alpha company have given concrete evidence of their willingness to co-operate by doing everything possible to make their plants safe. No expenditures of money are considered too great if they are spent to afford protection for the men.

F. R. Loveridge

"The safety bonus paid all Alpha employes is just another example that tends to prove that the company has the welfare of its men at heart and is willing to give back to its employes what it saves as a result of accident reduction. Over $90,000 has already been paid out in bonuses alone, and this act must surely show that the officers of the company are doing their part.

"But little trouble is experienced in getting the plant superintendents and foremen enthused over safety. They are quick to realize that their worries are lessened and their work is made lighter if their organization is not being constantly disturbed by having to break in new men to replace those incapacitated by accidents.

"It is not always so easy, however, to make the workmen see that of those who are helped by the safety movement they benefit most. Occasionally we still find a man who considers safety 'the bunk,' but thank goodness this type of numbskull is almost extinct. A few years ago this species was in the majority in most plants, and for that reason men were constantly being crippled and maimed.

"It has been a hard fight to make many of our men see that safety was created for their good, and until they were convinced our records were nothing of which to boast. As soon, however, as these fellows came to their senses and showed a willingness to co-operate with their foremen and superintendents, our accidents began to decrease and each year a new record was created."

The paper referred to the splendid record which has been made by the Alpha company at its several plants and stated that the credit for this showing is given entirely to the wonderful co-operation which exists in the organization.

Better Understanding Created

R. W. Hayden, assistant quarry superintendent at the Hannibal plant of the Universal Atlas Cement Co., followed in much the same vein, saying that the most important thing done at his plant during 1930 to prevent accidents was the creation of a better understanding between employer and employe on safety work. The employe was made to understand that the officials were solidly behind the movement and expected its plants to be operated in a manner to show that safety of a workman is of paramount importance. Continuing, Mr. Hayden said:

"In the past we had come to the conclusion that while safety education and safety rules were sufficient to secure the co-operation of the average man, measures had to be taken to impress those who did not so co-operate with the fact that the company was in earnest in wanting to protect employes and carry on operations safely. For such men we adopted disciplinary measures. The discipline was administered in the form of a layoff and varied with the nature of the offense.

"While such disciplinary measures have proven successful with other big industries, it failed to do so with us. It resulted in serious infections from small cuts and bruises of which the foreman had no knowledge.

"We found cases where the men would hide their small cuts, bruises, etc., and fail to receive first-aid treatment, for fear of being disciplined, regardless of whether the accident was a result of carelessness or otherwise.

"I want to call your attention to two such cases that we had last year.

"A Mexican fireman at one of our rock driers was helping replace a door on the side of the drier after hot dust had been removed. He lost his balance and stepped into hot dust with his left foot, burning a small blister on or near the ankle. He failed to report to the plant hospital for first-aid until seven days later. In the mean-

time infection set in and the man subsequently lost 20 days.

Cases Reviewed

"A fireman on a locomotive was trying to operate an injector and his hand slipped off the handle, striking the knuckle of the first

Ray E. Hoffman

finger of the right hand on a small cotter key, hardly breaking the skin. The man failed to report to the hospital for first-aid until four days later. By this time his hand had become badly infected, and the man lost 27 days.

"In both of these cases the accidents were not results of carelessness and the men would not have been disciplined. Had the men reported for first-aid promptly, no time would have been lost.

"As a result of such accidents as those mentioned, we abandoned the disciplinary measures except in the most flagrant cases of carelessness. Every effort was made to convince the men that the whole safety organization was trying to co-operate with them in this work, and that all injuries must be reported to their foremen and receive plant hospital attention."

Organization Improved

Improvement in organization for safety work was given by O. F. Schulzke, superintendent of the St. Louis plants for the Missouri Portland Cement Co., as the outstanding development of the year in safety work. He said:

"Until last year our safety organization was practically the same as the one we started with back in the early days of accident prevention, and probably similar to the organizations at other plants. It consisted of a permanent committee on which the foremen served and an inspection committee consisting of a man from each department chosen by the foremen. The inspection committee served for a period of two months, when another one was chosen. In this way we tried to have every man eventually come in contact with the permanent committee on safety work. These two committees met together once a week, the inspection committee making recommendations as to the guarding of equipment and the permanent committee passing on them.

"It is evident that, by this system, it took too long a time for all the men to serve on this inspection committee. In other words, we felt that we did not come into direct contact on safety matters often enough with the men in the plant. Our system was not along educational lines.

"So last year we started holding department meetings once a month. We split up our personnel into as few departments as possible and still not have over 15 to 20 men at a meeting. The meetings lasted from 20 to 30 minutes and were called at times most convenient for the departments. The foreman of each department, who acted as the chairman at his own meeting, made a five or 10 minute talk on safety matters pertaining to his particular department. The remainder of the time was taken up by safety recommendations made by the men and by discussions. Notes were made by the foreman or someone appointed by him and these notes were read and discussed at the permanent committee meeting held every two weeks.

Foremen Give Safety Talks

"This year we are following out practically the same scheme and intend to go into it a little farther by having all the foremen alternate in making talks on general safety topics to other departments besides their own. Over a period of four or five months each foreman will have made a talk to each department. At the permanent committee meetings, in addition to reading and discussing reports of the previous department meetings, we will arrange schedules and topics of discussion for the next ones.

"It is a difficult matter to determine exactly the benefits we derived from these department meetings. However, we do know that we are in closer touch with the men in regard to safety matters and the interest taken by the men in these meetings shows us that they have benefited by them."

Other papers were given by D. B. Coleman, safety engineer, Missouri Portland Cement Co., on "Accidents Involving Powdered Coal and Gas," and by Claude P. Dempsey, foreman miner, United States Bureau of Mines, on "Results from First-Aid Training."

Construction Problem Again

At the afternoon session the matter of safeguarding employes in construction work came up again for discussion as it has at other meetings during the year. Joseph E. Vollmer, vice-president, Fruin-Colnon Construction Co., St. Louis, took up this subject as well as that of the investigation of serious accidents. The latter subject was also discussed by J. M. Stolle, superintendent, bag and packing department, Universal Atlas Cement Co., Hannibal, Mo., whose paper will be printed in a later issue.

Talks were also given on "Safety and First-Aid Training" by A. U. Miller and W. D. Ryan, representatives of the United States Bureau of Mines.

A dinner was held in the evening with Raymond E. Hoffman, superintendent of the

P. C. Blaise

Hannibal plant of the Universal Atlas Cement Co., as toastmaster. The speaker of the evening was Robert E. Lee, past president of the St. Louis Safety Council.

Survey of Speed Reducer Applications

THE W. A. JONES FOUNDRY AND MACHINE CO., Chicago, Ill., has issued a very interesting and comprehensive booklet on the application and advantages of speed reducers in the rock products industries, together with flow sheets of cement, lime, gypsum, crushed stone and sand and gravel plants.

The booklet contains considerable data of value. It was prepared as the result of a survey made to show the operator of the average sized plant the possibilities and benefits of speed reducer application. As such it is a worth while contribution to the efforts of all speed reducer manufacturers, in the development of a more general use.

It also contains a price list of stock models which is particularly helpful.

Courtesy *The Medusa Mirror*

J. B. John, president, Medusa Portland Cement Co., and replica of safety trophy

Replica of Safety Trophy Presented to J. B. John

THE evening of February 24 will long be remembered by those of us who were fortunate to be present at the home of J. B. John, president of the Medusa Portland Cement Co., it being the occasion of the presentation to him of a small gold replica of the safety trophy mounted on a black marble base.

The superintendents of all the plants under Mr. John's management, having won a trophy each in 1929 or 1930, decided it would be fitting that the trophy be presented in miniature to him who has been the inspiration for all of us in this work.

An opportune time presented itself when the superintendents were called in for a meeting at the Cleveland office.

A dinner was arranged by Mr. John at his home, to which we were invited, and when the chairs were pushed back and cigars lighted, Mr. White introduced Mr. Maguire, who, in a very appropriate speech, made the presentation.

Mr. John replied in his usual manner, somewhat lost for words at first due to his surprise, but he soon got going and took us back over his early life and the struggles endured in the coal mines after his father had been taken from them by an accident when Mr. John was a small boy. This accounted, he said, for the keen interest he has had in safety, which to him is more or less a religion.

Those present were: Messrs. J. B. John, E. J. Maguire, W. L. White, Jr., W. E. Wuerth Dixon; W. J. Worthy, Toledo; A. J. Little, Bay Bridge; R. J. Landis, York; W. P. Rice, Wampum; F. E. Town, Manitowoc; L. E. Smith, Newaygo; W. M. Powell, all of the Medusa organization, and E. C. Switzer, Petoskey Portland Cement Co.—*The Medusa Mirror.*

Tennessee Cement Mills Get State's Business

CLAIMING that recommendations of the Hoover emergency commission in regard to favoring local industry has been carried out as far as possible, the State Purchasing Department of Tennessee recently sent out contracts to five Tennessee cement mills ordering approximately 810,000 bbl. of cement to be used in highway construction.

According to Commissioner R. H. Baker of the Highway Department, who authorized the purchase, a price 3 c. per bbl. under the low bidder at a recent letting was guaranteed by the Tennessee manufacturers, and the state saved approximately $20,000 in the deal.

Bids were sought several weeks ago, and rejected following a general decline in cement prices of approximately 5 c. per bbl. When new bids were opened last week it was found that the Marquette Cement Manufacturing Co. was low bidder. The five Tennessee mills—two at Chattanooga, two at Nashville and one at Kingsport—asked that they be permitted to guarantee a price 3 c. a barrel less, claiming that their plants were being operated on part time, and urging that this business come to Tennessee mills. This plan was agreed upon and the order placed.—*Nashville* (Tenn.) *Banner.*

Another Cement Mill Proposed

IF A SUITABLE LOCATION is found a second cement plant will be established at Redwood Harbor, Calif., C. E. Miller, president of the National Silicate Products Co., said recently.

Mr. Miller, whose firm operates its main plant at Lompoc, said that the new plant would represent an ultimate investment of $2,000,000. A quick-hardening cement will be manufactured.

A test plant in San Francisco was completed recently, and other plants are to be operated in New Jersey and Michigan. Mr. Miller will build his plant just as soon as the location is determined upon.—*San Jose* (Calif.) *Mercury-Herald.*

Agitation for State Plant

CONSTRUCTION by the state of Texas of a cement manufacturing plant to cost $500,000 is provided for in a bill which has been introduced in the legislature by Representative J. L. Goodman of Franklin. The proposed plant will be operated under the direction of the state prison commission and convict labor will be employed. Location of the industry is to be left to a commission that is to be appointed for the purpose. The bill provides that the product of the plant shall be used in the construction of highways, and that it shall be sold at a price which will net the state a profit of not more than 3%.

Marquette Cement Makes First Water Shipment from La Salle

AS THE FIRST BARGE shipment of Marquette cement recently was moving along the Illinois waterway, destined for storage silos at St. Louis, officials of the Marquette Cement Manufacturing Co. announced that the company has purchased large tracts of land on the south side of the Illinois river at La Salle as the eventual site for a private river terminal.

The principal tract purchased by the Marquette concern from the La Salle County Carbon Coal Co. lies between the new Shippingsport bridge and the Illinois Central right-of-way near Jonesville and between the river and state highway Route 2. Another narrow strip of land purchased for use in connection with a terminal is on the south side of the state highway from the Marquette road, immediately south of the old river bridge, eastward to the old Jonesville mine shaft.

W. A. Wecker, secretary-treasurer of the Marquette company, announced to the (La Salle, Ill.) *Daily Post-Tribune* that the deal for the purchase of the land, which is approximately 30 acres in area, was only recently closed with officials of the La Salle County Carbon Coal Co.

"We bought this property," declared Mr. Wecker, "as a possible future terminal site under our own control. It provides an assurance that should be decide to do so, we will be able to continue transporting our product by water under all circumstances."

The cement company officials pointed out that the site is ideally located for a water terminal, declaring that it affords ready accessibility from both the Burlington and Illinois Central railroads, from which lines transfer tracks would be built into the terminal property.

"Not to be overlooked," said Mr. Wecker, "is the fact that in procuring this terminal property we will have our own right-of-way, if trouble with the railroads should later develop." He indicated that in the event of a controversy with the railroads the Marquette company could build its own railroad trackage from its Oglesby mill northward approximately three miles to the terminal.

He was unable to state when the Marquette company will enter upon a definite program for the continuous shipment of cement via the Illinois waterway and declared that the trip now being made from Peru, where temporary transfer equipment has been set up on Burlington railroad property, is merely a "test trip."

"Twenty or more trips will probably be necessary before the Marquette company definitely decides on a program after analyzing cost figures," said Mr. Wecker. "It is a great undertaking and if it proves successful it will mark a distinctly advantageous method of lowering cement costs. If the tests prove transportation of cement by water to be feasible, our company will in all probability continue it and will then take steps for permanent terminal facilities."

Richard Moyle, general superintendent of the Marquette, is highly enthusiastic over the waterway prospects. Telephoned by the *Daily Post-Tribune,* however, he was unable to elaborate upon what Mr. Wecker had said.

"We don't know the costs yet," declared Mr. Moyle. "That's what we are working on. We want to know ourselves just what it is going to cost us to get cement to St. Louis from our plant."

Mr. Moyle indicated that the expense of transferring the cement in bulk from the huge Oglesby plant to the terminal site, which is near the confluence of the Vermilion river, would not be prohibitive. The deepening of the river to 9 ft. has put navigable water three miles nearer the plant than previously and it was to take advantage of this opportunity for a shorter haul to the river that that tract of land was purchased. —*La Salle* (Ill.) *Post-Tribune.*

Convict-Operated Cement Plant Proposed in Oklahoma

THE Oklahoma house of representatives has passed a bill (H. 453) to provide for the establishment of a state cement plant to be manned by prison labor.

The bill provides for appropriating $300,000 from the state highway construction and maintenance fund and $200,000 from the state penitentiary revolving fund to construct and equip the proposed plant.

The plant would be constructed under direction of the state board of affairs and located at the state penitentiary at McAlester or some convenient place to be decided upon by the board.

Would Sell Michigan State Cement Plant

A BILL authorizing the state of Michigan to sell its cement plant at Chelsea has been submitted in the house of representatives by Rep. Dexter G. Look of Lowell. The measure sets no definite price. The cement plant has been in operation by the state since 1923 when Former Governor Alex J. Groesbeck put through its purchase from the Michigan Portland Cement Co. at a total cost of $625,000. The current deficit of the cement plant in the general fund is $661,630.—*Saginaw* (Mich.) *News.*

Improvements Under Way at Dewey Cement Mill

THE Dewey Portland Cement Co., Dewey, Okla., is installing 16-ft. Sturtevant air separators on both raw and finish mills; also a Fuller-Kinyon blending and pumping system, according to reports.

Wisconsin Unlikely to Have State Cement Plant—Has No Limestone

DECLARING that there are insufficient limestone deposits in the state of Wisconsin to permit profitable cement production, and that the Manitowoc Portland Cement Co. was compelled to ship in most of the raw materials, H. Vanderwerp, recently at Madison, Wis., before the assembly commerce and manufacturers committee hearing. The committee was conducting a hearing on the bill of Assemblyman Ben Rubin, calling for the appointment of a committee to learn the feasibility of state-owned and state-operated cement manufacturing plants.

In addition to Mr. Vanderwerp, Secretary Phil Dawson, of the Manitowoc company, who is now located at Cleveland, Ohio, also appeared before the committee against the bill. They were aided in their fight by Senator John Cashman, Denmark, who opposed "too many" interim committees.

"Two years ago we went wild on these interim committees appointing about 23, and they take a lot of money," said Senator Cashman at the hearing. "Let us call our own state experts to determine what such committee would be paid to do.

"We cannot manufacture cement because it is a scientific job. This is far too technical a proposition" continued Mr. Cashman in opposing the move to recommend voting $10,000 for a state investigation of a state-owned cement plant.

Principal opposition to the move came in the statements of persons at the hearing that Wisconsin had not sufficient resources to make a state-owned plant profitable. Assemblyman Eber, Milwaukee, member of the committee opposed the plan because of the $10,000 sum called for in the bill.

Senator Cashman's opposition to the Rubin bill came principally on the ground that the legislature was creating too many committees to make investigations and that many times little good resulted. Mr. Vanderwerp of the local company insisted that it would be unfair for the committee to gather data and spread it on the records so that other committees could use it, holding that much of the information he had gathered with his own hands. He said:

"The Rubin bill is unfair because it gives the investigating committee the power to subpoena witnesses and records. Gentlemen, I started to gather this information with these two hands of mine when I was 16 years of age. Do you think it fair to take this from me and spread it on the records for my competitors to read?"

The committee has not drafted a report on the Rubin bill, but from the sentiment at the hearing at Madison recently it is believed that the measure will be given an adverse recommendation from the committee when it comes before the legislature for a vote.—*Manitowoc* (Wis.) *Herald-News.*

Foreign Abstracts and Patent Review

Grinding in Tube Mills. A. B. Helbig deals with grinding in tube mills, outlining the requirements for grinding raw tube-mill feed, fuel and cement. In raw grinding it is all important that the granules of the components of the material have as much as possible the same size, so that they reach the sintering temperature in the kiln at about the same time. The granular sizes of the air-separated raw feed deviate less in size from each other than those produced in a multi-chamber mill. The air-separator tube mill (Helbig's double mill) is superior to the three-compartment mill. Moreover, the air-separator mill is not as sensitive to a possible increase of the moisture content of the raw material.

In order to effect a simultaneous burning of the fuel as fast as possible, the granules of the pulverized fuel should be as uniform as possible in size, so that here also the air-separator tube mill is to be preferred to the ordinary three-compartment mill which, moreover, consumes too much power.

The cement should have its granules as uniform and as fine as possible, as this increases the specially important early strengths. The air-separator mill has met with favor also in this respect. A series of tests was made to determine the best load of grinding media in the individual compartments of a three-compartment mill of 1.8 m. (5 ft. 10 in.) diameter and 11 m. (35 ft. 9 in.) length, supplied with rotary kiln clinker. The following is one of these tests, given here because of the peculiarity in grinding result.

In compartment I, shown in Fig. 1, the residue was ground from 82% to 40% on the 900-mesh screen and from 88% to 52% on the 4900-mesh screen, which is an excellent output, and was due to the correct load of grinding media for the clinker in question. It is strange that there is a difference of 10% residue on the 4900-mesh screen and of 16% on the 900-mesh screen between the material taken from the mill before and behind the first partition. This difference is usually 7 to 9% on the 900-mesh and 4 to 8% on the 4900-mesh screen. This may be explained by the statement that due to a comparatively great difference in the size of the grinding media of the first and second compartments a congestion of the material occurred back of the first partition.

In the compartment II there is a decrease of the residue of 11% on the 900-mesh screen and of 10% on the 4900-mesh screen, over a distance of 2.2 m. (7 ft. 1½ in.) The second partition brings about a decrease of 5% on the 900-mesh and of 6% on the 4900-mesh screen. Over a distance of 5.9 m. (19 ft.) the residue disappears on the 900-mesh screen, while 8% remain on the 4900-mesh screen. The curve for the 4900-mesh screen has been extended; accordingly the mill would have to be lengthened 6 m. (19 ft. 5 in.) in order to reduce the residue to 2% at the same feed, so that the mill would be 17 m. (55 ft.) long instead of 11 m. (35 ft. 9 in.), so that at a reduction of 8% to 2% the decrease in output must likely be much more than 10%.

The curves in Fig. 2 have been drawn on the assumption that the three-compartment mill is designed as a two-compartment mill, whereby the first partition is shifted 1 m. (3 ft. 3 in.) to the right, so that the first compartment is 3.2 m. (10 ft. 4 in.) long instead of 2.2 m. (7 ft. 2 in.). Assuming that the curves for compartment I of Fig. 1 remain the same, these have been extended in Fig. 2, so that the first compartment here gives a flour with 38% residue on the 4900-mesh screen. Assuming that the decrease in the residue remains the same in the second compartment of the compound mill, as previously in the third compartment of the multi-compartment mill, there is a decrease of 6% on the 4900-mesh screen between the material before and behind the partition, whereas a drop of 14%

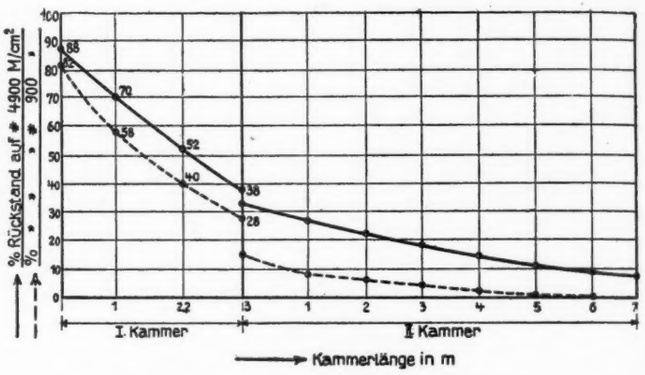


Fig. 2. Fineness in relation to the length of the mill at a constant output of rotary kiln clinker

Per cent. residue on the 4900-mesh indicated by solid line.
Per cent. residue on the 900-mesh indicated by broken line.
Compartment I. Compartment II.
Length of compartment shown in meters (1 m. is 3.28 ft.).

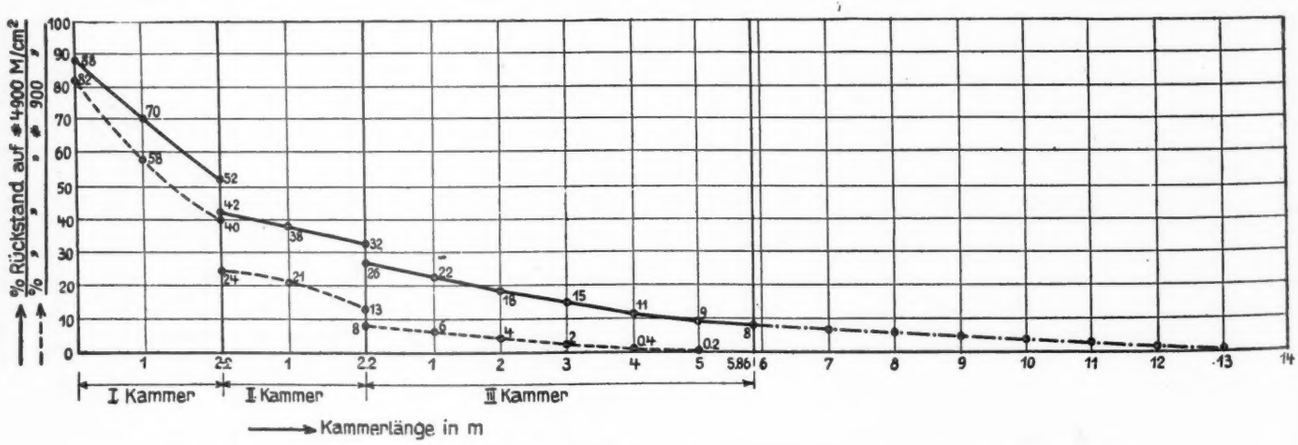


Fig. 1. Fineness in relation to the length of the mill at a constant output of rotary kiln clinker

I Compartment. II Compartment. III Compartment.
Length of compartments shown in meters (1 m. is 3.28 ft.).
Per cent. residue on the 4900 mesh screen indicated by solid line.
Per cent. residue on the 900-mesh screen indicated by broken line.

would occur with the 900-mesh screen.

As to at what point in the three-compartment mill an air-separator should be connected, is an open question that must be answered by tests. With a grinding length of 4.4 m. (14 ft. 3 in.) of the first two compartments, the decrease on the 4900-mesh screen from the charging end of the mill to behind the second partition is 88 to 26 = 62 ÷ 4.4 = 14% per meter of grinding length. In the first meter of the third chamber the decrease is 88 to 22 = 66 ÷ 5.4 = 12%. In the second meter the decrease is 88 to 18 = 70 ÷ 6.4 = 11%. According to the data available to the author, he assumes that air separation should start after a grinding length of 5 m. (16 ft. 2 in.), which assumption can be varied fundamentally by the findings of a scientific examination of the material to be ground respective to granular size under consideration of the normal and early strength cement to be produced by the mill; for only by the use of the scientific air-separation analysis can it be determined what quantity of cement can actually be screened off by the air separator. The residue on the 4900-mesh screen gives no hint about this. At any rate, the quantity to be removed for a residue of 22% on the 4900-mesh screen for 1 m. grinding length in the third compartment is considerably below 78%.

The essential difference in the installation of an air separator in the past, and today in the closed-circuit separator, is this that today the air separator is not used as in the past, to draw off a cement which has about the same residue on the 4900-mesh screen, but that we screen from the material the very finest, passing it several times through the air separator. Upon the basis of the present state of engineering, the author believes that the material to be screened off from an average granular size for a first grade cement is between 10 and 20 μ (microns). When the air separator is installed, the partitions serves only the purpose of keeping the individual granular sizes apart. The separating effect of the partitions is rather difficult to carry through by means of screens or performated plates, and for this reason the Allis-Chalmers Co. has, as Naske suggests, changed over from the wire-screen interstage separation to the interstage air-separation.—*Zement* (1930) 19, 37, pp. 870-873.

Grinding in Tube Mills With and Without Air Separation. Bellwinckel criticizes A. B. Helbig for representing the grinding in tube mills equipped with air separators (see *Zement* No. 37, 1930) as being considerably superior to grinding without air separators, because Helbig's investigations and considerations do not comply with actual operations and are partly incorrect. It was improper to use the experiments of Grosse, Foerderreuther and Rammler as a basis for exhaustive considerations of the grinding process in a screenless tube mill, since these men made their tests only to clarify and investigate the grinding principles of the tube mill, which was run far from at its best output. The universally recognized superiority of grinding raw materials with air separators, as determined by Helbig, must be denied, since tube mills without screens give outputs which cannot be surpassed by a mill with air separator. Helbig suggests similar granular size for the raw flour so that all particles will start to burn at a uniform time in the kiln; this can be done by air separation if the specific gravity of all particles are the same. But this does not consider that the raw flour lumps more or less and enters in lumps into the sintering zone. That the air-separating mill is better for the cement in reference to the most favorable granular composition has not been proven, and further results of investigations should be awaited before making final conclusions. Helbig's extension of the tube mill grinding curve is also criticized as being of no value and the views of Helbig regarding the Allis-Chalmers mill are erroneous.—*Zement* (1930) **19**, 49, pp. 1161-1163.

Recent Process Patents

The following brief abstracts are of current process patents issued by the U. S. Patent Office, Washington, D. C. Complete copies may be obtained by sending 10c to the Commissioner of Patents, Washington, D. C., for each patent desired.

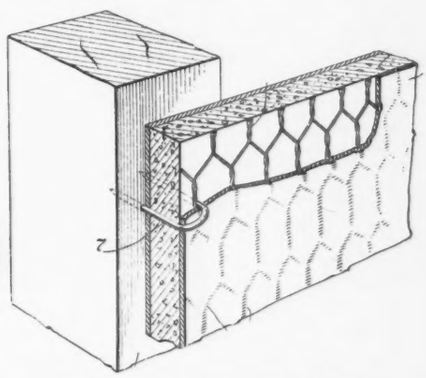
Paving Material. The inventors prepare an asphaltic road material that can be laid cold using natural Uvalde rock asphalt to which a fluxing agent is added. The most satisfactory fluxing agent is, they find, an oil containing a number of volatile fractions which volatilize at progressive temperatures up to 325 deg. F. Their method is distinguished from prior ones in that older processes used a fluxing agent from which all the volatile content evaporated very materially below 325 deg. F.—*Glenn H. Alvey and Ernest A. Young, assignors to the Uvalde Rock Asphalt Co., U. S. Patent No.* 1,767,830.

Cement Composition. The author of the patent uses an accelerating agent consisting of a water soluble salt of carbonic acid, such as sodium carbonate or sodium bicarbonate. which he claims induces a thin cement grout to set to a dense concrete. Slag can be ground with the cement. One part by weight of sodium carbonate to 100 parts of cement clinker and 3 parts of gypsum are recommended. If slag is used, he proposes 100 parts portland cement clinker, 50 parts ground slag, 4 parts ground gypsum and 2 parts sodium carbonate.—*Max E. Grunewald, U. S. Patent No.* 1,748,839.

Plastic Composition. This invention relates to a plaster composition useful as an insulating material, particularly for electrical heating devices. The ingredients of the plastic are ground slate, baked or calcined slate, silicon carbide and a moistening solution of sodium silicate. Soapstone may be used also. The pulp is first dried and then baked at 1600 deg. F., resulting in a hard refractory substance of high electrical resistance.—*Herbert V. Leckie and Watson H. Woodford, assignors to the Remington Arms Co., U. S. Patent No.* 1,768,363.

Plaster Board Reinforcements. The patentee describes his method of manufacturing a gypsum wallboard which has an added reinforcement in the nature of wire mesh or other metal reinforcements.

The wire is carried on a roll and is carried upon the lower paper sheet and close to the surface so that an imprint is left on the wallboard's face that will enable the carpenter, placing the board, to drive his staple or nail where it would be most advantageous.—*Curry O. Walper, assignor to the United States Gypsum Co. U. S. Patent No.* 1,749,009.



Wire reinforced plaster board

Wire mesh imbedded in plaster board

Cement Products

Sand Producer Finds Transit-Mix Concrete Profitable

Steckel Sand Co., Easton, Penn., Proves Small as Well as Large Aggregate Producer Can Profit

Batching hopper delivering to transit mixer

Delivery to forms direct from mixer

THE Steckel Sand Co. of Easton, Penn., recently put into operation a small but well equipped ready-mixed concrete plant at its gravel pit near Phillipsburg, N. J., writes R. L. Rhodes in a recent issue of *Alpha Aids*, monthly house organ of the Alpha Portland Cement Co., Easton. His story continues: Shortly after the plant was completed, Chas. C. Steckel, owner and operator, contracted to furnish concrete for the fieldhouse of the new stadium at Phillipsburg high school. The requirements for this work, though modern and exacting, were fully satisfied as described below.

The job consisted of pouring the fieldhouse foundations and H. J. Banahan, the contractor for the fieldhouse, decided to use ready-mixed concrete, not only because he thought it economic to do so, but because he felt it possible to secure more accurate control of the concrete. Saving of time was also an important factor.

The equipment used on the job consisted of two 2½-cu. yd. and one 1½-cu. yd. mixer trucks. Materials were batched by weight and loaded into the trucks at the plant about a mile and a half from the job. The water for each batch was obtained from a tank on the truck. The tank is equipped with a measuring device so that exactly the proper quantity of water is furnished to each batch.

Test Batch Made

Gavin Hadden, New York City, designing engineer of the entire stadium job, had specified that the concrete as placed in the forms should show a slump of from 6 to 7 in. and obtain a strength in 28 days of not less than 2000 lb. A miniature batch was made up as an experiment to determine how much water was necessary to produce the consistency or slump desired. From these data was calculated the exact quantity of water to add to each mixer truck batch. The first batch delivered on the job showed a slump of 6 in. and it was possible to maintain this consistency to the complete satisfaction of the resident engineer, Robert O'Connor, of New York City.

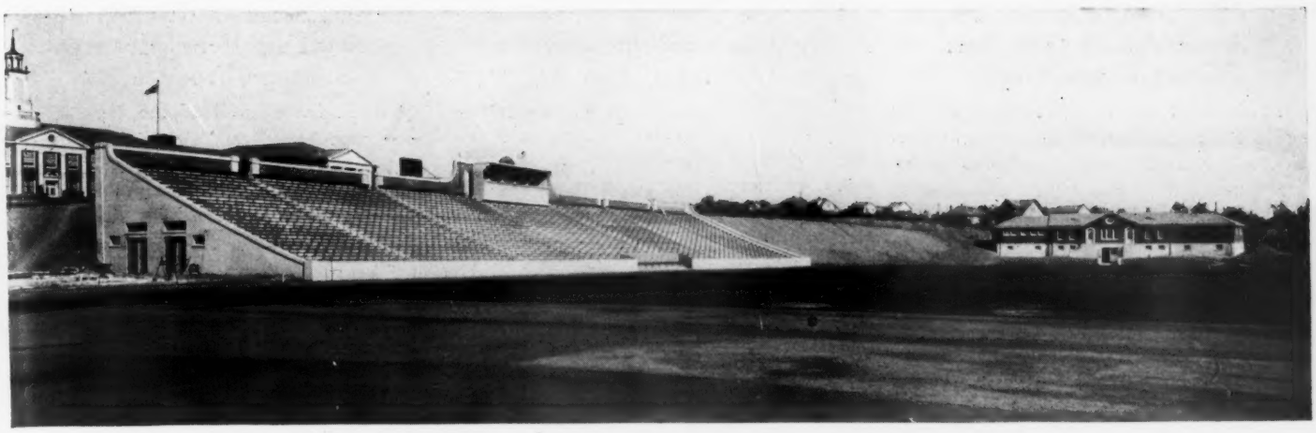
The usual handicaps were encountered on the job. Owing to heavy rains, some difficulty was experienced at first in backing the trucks close to the forms. Due to the height of the foundation walls, an average of 10 ft., it was not possible to chute the concrete directly into the top of the forms and this was solved by cutting holes in the forms several feet from the top. Only above these points was it necessary to transport the concrete in buggies.

Despite the wet weather and other obstacles, good progress was made; 100 cu. yd. of concrete were placed in one day and the remaining 70 cu. yd. on the job were poured the following morning.

Test cylinders were made of the concrete on the job and when tested at Lafayette College, Easton, Penn., it was found that the specified 28-day strength had been exceeded in 7 days. The 28-day tests exceeded the requirements by over 50%.

The 170 cu. yd. of concrete were placed on Friday and Saturday, July 11 and 12. The forms were stripped on Monday morning, July 14, and the remainder of that day spent in rubbing down the walls to produce an even finish. The brick work was started on top of the walls on the morning of Wednesday, July 16. This job illustrates the efficiency of the small ready-mixed or transit-mixed plant.

Considerable public interest was shown in the job and it was visited several times by various officials of the town and school



Stadium and field house of Phillipsburg High School, Phillipsburg, N. J.

board. Confidence in the contractor's ability to complete the job by the football season was materially increased when it was seen how quickly the concrete foundation was constructed.

The fieldhouse proper is of brick construction, requiring approximately 65,000 brick, of which 44,000 were concrete brick manufactured by Schedler and Murphy, Inc., Phillipsburg, N. J.

Neighbors Object to Ready-Mix

AN ATTORNEY has been retained to represent remonstrants against the issuance of a permit to Howard T. Sherman to construct a steel bin on his property on West Main street, New Britain, Conn., and Building Inspector A. N. Rutherford was notified of intent of the attorney to take an appeal from his action in granting the permit. The appeal automatically stays the work.

The steel bin is a part of a ready-mixed concrete plant which Mr. Sherman plans to build. As soon as residents of Hamilton street and vicinity learned of it they circulated a petition which has been turned over to Attorney Gaffney with approximately 60 signatures.

According to the remonstrants, the proposed plant would be noisy and its operation would depreciate the value of surrounding property. The Sherman property is in an industrial district. The appeal will be acted on by the board of adjustment.—*New Britain* (Conn.) *Herald.*

Clinton, Ia., Ready-Mix Plant

CONSTRUCTION WORK upon the new concrete mixing plant of the Ready Mixed Concrete, Inc., of which Fred L. Scott, Ames, Iowa, is vice-president and in charge of the local branch, is being completed at Clinton, Iowa. The plant which is located in the C. D. & M. car barns will soon be in operation. The plant will have capacity of 150 cu. yd. of mixed concrete daily and an auxiliary unit will be installed if business warrants the expansion.

Freight-Rate Increases Threaten Closing of Tennessee Plants

TWO HUNDRED FAMILIES will be affected by the shutdown of gravel pits in the Camden, Tenn., section following the increase on gravel shipments to Memphis and Mississippi points.

Both the Memphis Stone and Gravel Co. and the Camden Road Material Co. will be hard hit, officials report. The former concern has a $100,000 investment here, including the building of a $60,000 plant in 1930.

The freight increase per ton on gravel from 79 c. to $1.30 makes competition with the many gravel pits in Mississippi almost impossible, it is pointed out. The increase, which became effective March 13, was granted the N., C. & St. L. recently by the Interstate Commerce Commission. The average amount paid on a car from Camden to Memphis was $35. Under the increase it is $58 per car. The Camden pit has averaged 40 cars daily, furnishing much road material.

An average of 100 men are employed by the Memphis Stone and Gravel Co. In case the shutdown is put into effect, a large number of residents in this section will be thrown out of work.—*Nashville* (Tenn.) *Tennessean.*

New Handbook on Concrete for Builders

A NEW BOOKLET including latest information on the modern methods for making concrete has just been published by the Portland Cement Association.

"Concrete Facts for Concrete Contractors" is the title of this booklet which is available on request to the association offices, 33 West Grand Avenue, Chicago, Ill.

The booklet deals with concrete making, including facts on colored concrete, special surface finishes, forms, watertight concrete and cold weather construction. The methods described, it is stated, are thoroughly practical and are being used by an increasing number of contractors.

Feldspar Standards

THE UNITED STATES DEPARTMENT OF COMMERCE, Bureau of Standards, has issued Commercial Standard, CS-23-30, on Feldspar. On January 14, 1930, a general conference of manufacturers advocated the adoption of a commercial standard for feldspar as one of the steps in the elimination of waste through simplified commercial practices that is being fostered by the Department of Commerce.

The booklet, priced at 3c by the Superintendent of Documents, Washington, D. C., gives the general classifications of feldspar.

Wire Rope of Stainless Steel

A WIRE ROPE made of "Korodless" stainless steel, which it is claimed resists practically all chemicals, salt water and salt air erosion, is announced by the Hazard Wire Rope Co., Wilkes-Barre, Penn.

As in the company's "Lay-Set" preformed wire rope, the strands and wires are helically shaped to the exact form they assume in the rope structure.

Danger from Blasting Gases

THE Bureau of Mines, Department of Commerce has issued a circular (No. 6043) warning those who have charge of underground work of the danger from gases that come from blasting. It reports an accident in which one man was killed and seven others were overcome.

This warning would seem to be particularly applicable to those engaged in mining the non-metallic minerals. Mines for these minerals (especially limestone mines) are often compelled to employ untrained men who have never encountered the dangers of underground work. Rules for safeguarding the men should be adopted and posted and men should be watched to see that they do not enter workings (especially raises) until it is certain that the gases have been blown out. The circular says that workings are usually safe as soon as a man starts to use an air drill.

President of National Crushed Stone Association Sees Good Times Ahead

SEASONAL RESUMPTION of activity in the crushed stone industry will provide a substantial increase of employment before the end of this month, according to a statement received by Colonel Arthur Woods, chairman of the President's Emergency Committee for Employment, from A. L. Worthen, of New Haven, Conn., president of the National Crushed Stone Association.

"This association represents about 200 firms supplying about 75% of the output of the entire crushed stone industry, Mr. Worthen said, "Our output and employment normally fall off during the winter in regions where the volume of concrete construction is inhibited by cold weather. The pick-up of production usually comes about the end of March. Already some of our firms are beginning to increase their organizations in anticipation.

"Although layoffs of personnel have been inevitable, due to seasonality, which is normal, and also to the slump in certain lines of construction, our member firms have made efforts to spread employment as widely as possible by part-time operations and other expedients. Now that resumed activity is close at hand, we shall be able to build up our payrolls substantially.

"How far we can go in approaching the summer employment peaks of former years depends, of course, on the volume of construction which develops. There is no doubt that the expediting of public and semi-public construction will aid our business very materially. The national emergency program already has helped carry us through the depression thus far," Mr. Worthen declared.—*New Haven* (Conn.) *Register.*

Old New Jersey Crushing Plant to Start Again

THE KINGSTON QUARRY CO., Inc., has leased the old Rocky Hill quarries in Franklin township, New Jersey, and will begin operations there about April 1, according to Justice of the Peace Theodore R. Potts, one of the stockholders, who says a large number of men will be employed.

Mr. Potts and Charles A. Williamson are the majority stockholders in the company, which was incorporated in December.

The abandoned stone crusher is to be renovated and is expected to supply neighboring townships, notably Montgomery and Franklin, with road material in the near future.

The operation of the plant will give Rocky Hill an industry, the town's crying need since the closing-down of the Atlantic Terra Cotta concern. The stone supply in the quarry is almost inexhaustible.—*Somerville* (N. J.) *Gazette.*

St. Louis Quarries in Perennial Fight to Keep in Operation

ONE HUNDRED AND TWENTY-FIVE PERSONS who reside in the vicinity of the quarry operated by the Union Quarry and Construction Co., asked the Circuit court recently to enjoin the firm from further operations of the quarry.

The petition charged blasting operations endangered life by throwing fragments of rock and other debris upon roofs and into yards near by. The petitioners termed the quarry as a nuisance within the meaning of the law in that it was a source of much noise and dust.—*St. Louis* (Mo.) *Globe-Democrat.*

* * * * *

A suit to enjoin Hoffman Bros. Construction Co. from operating a rock crusher at its quarry is on trial before Judge Rosskopf.

The suit was brought in the name of the circuit attorney at the request of Mrs. Fred Adams, whose home at 4420 Ohio Avenue is about 80 ft. from the quarry. She did not testify on direct examination, but her husband told the court that noise and dust from the crusher had caused her to suffer a nervous ailment. The value of the Adams property also was impaired, it is alleged.

Evidence showed an appeal was made to Director of Streets and Sewers Brooks to put an end to the alleged nuisance. He declined to interfere.

The defense contends the section in controversy was never legally dedicated as a street; further, it is not a thoroughfare, since the crusher site is at the verge of a precipice more than 30 ft. deep and has been fenced off as protection to the public.

Several neighbors testified the crusher did not annoy them. They said much of the dust came from the workhouse quarry and a brickyard, both of which are in the vicinity. It was brought out Mrs. Adams acquired her property three years ago, while the crusher has been in operation since 1903 and the quarry for 35 years.

Alderman John A. Fett of the Eleventh ward, whose home at 4416 South Broadway is within three or four blocks of the crusher, testified the construction company's business was in a commercial district and furnished considerable employment. He said he did not regard the crusher a nuisance.—*St. Louis* (Mo.) *Post Dispatch.*

* * * * *

THE Missouri Court of Appeals handed down a decision March 4 holding unconstitutional a Maplewood, Mo., ordinance which requires express permission from the city council before operation within the city limits of a stone quarry, brick kiln, slaughter house or similar activity.

The decision was rendered in the suit of Roger Davison, operator of a stone quarry, for a writ of habeas corpus against Sheriff Lill. Davison was arrested and fined $75 on a charge of operating his quarry.—*Clayton* (Mo.) *Leader.*

F. O. Earnshaw Elected President of Pennsylvania Stone Producers

AT A MEETING of the Pennsylvania Stone Producers' Association, Harrisburg, Penn., March 13, Fred O. Earnshaw, president of the Carbon Limestone Co., Youngstown, Ohio, was elected president; S. W. Stauffer, of the J. E. Baker Co., York, Penn., vice-president, and P. B. Reinhold, Reinhold & Co., Pittsburgh, Penn., was re-elected secretary and treasurer.

Subjects receiving special discussion at the meeting were the state highway specifications and the surety bond situation. Under the chairmanship of M. L. Jacobs, Bethlehem Mines Corp., Bethlehem, Penn., a committee has prepared and submitted to the state legislature a proposed new bonding law.

W. M. Andrews, Lake Erie Limestone Co., Youngstown, Ohio, member of the executive committee of the National Crushed Stone Association, reported on the recent executive committee meeting in Washington, D. C., and the plans for research work and its financing. Mr. Andrews also reported as chairman of the uniform sales contract committee, which has submitted a standard form of contract, which has been accepted by the Pennsylvania association.

South Carolina Crushed Stone Operator Speaks His Mind

TWO STEAM SHOVELS, a railroad, 60 men and a complete rock crushing and loading plant are operating at nearly peak capacity now at the Saluda Crushed Stone Co. quarry at Hellams, S. C.

W. H. Cook, president of the company, and active manager of the plant, is optimistic over the outlook of business for the quarry during the present year although he has a complaint to lodge against the state highway department for fixing the price of crushed stone for highway work 25c a ton lower at his quarry than at the quarries in the vicinity of Columbia.

"Time and tests have proved beyond all question that Saluda crushed stone is excellent," Mr. Cook said, "but yet they want to pay me 25c a ton less than they do the quarries around Columbia. The whole thing is that the state highway department, thinking itself an all-powerful political organization that domineered everything, wasted so much money that it was a shame. Now it has been shown that the people won't stand for such dominance and the state highway department is trying to get back and show a whole lot of economy and make the material man stand the gaff. The material men do not mind bearing their part but they will not stand for unjust discrimination. Twenty-five cents a ton is a very heavy cut."—*Greenville* (S. C.) *Piedmont.*

District of Columbia Government Threatens to Produce Its Own Gravel

IN VIEW of the recent sharp increases in the price of sand and gravel coming at the outset of the District of Columbia's highway building season, Engineer Commissioner John C. Gotwals recently decided to ask in all future highway contracts for alternative figures for the jobs on the basis of the contractor supplying the sand and gravel, and on the basis of a supply of these materials by the District government.

On February 23 the Smoot Sand and Gravel Co. and the Columbia Sand and Gravel Co., which do practically the entire business locally, announced substantial increases in the prices of their product. Gravel went from $1 to $1.30 per ton; concrete sand from 55 to 85 cents per ton and asphalt sand from 85 cents to $1.20 per ton.

Based on the calculation of Captain Herbert C. Whitehurst, District highway engineer, this would mean an increase in material costs for the highway department alone of $107,601, and, taking the other departments in the district government into consideration, the increase would be about $130,000.

Commissioner Gotwals said that he felt this was a particularly bad time for the increase, as he wants all the money that he can possibly get for the employment of labor. In highway construction work the District gets lump sum appropriations and the more money it spends on materials the less it has available for labor. Maj. Gotwals wants to have the comparative bids so that he will be able to show congress how much could be saved if the District supplied the sand and gravel. If the savings appear impressive enough, then he intends to ask for authority and appropriations for the District to set up sand and gravel works and go into the business itself.

Any action in this regard, however, could not come until the next fiscal year, and in the meantime, apparently, the District must pay the increased price, as it would be more expensive to buy the sand and gravel from outside sources.

It is estimated that the Highway Department will need 213,699 tons of gravel, 117,128 tons of concrete sand and 23,866 tons of asphalt sand for its coming working season. —*Washington* (D. C.) *Star.*

New Texas Ready-Mix Plant

THE Fort Worth Sand and Gravel Co., Fort Worth, Tex., is building a new central mixing plant for the manufacture of concrete with new truck-loading bins in connection.

The plant will be located just east of the Santa Fe railroad tracks at Seventh Street within a few blocks of the downtown section, and it is expected to have it completed and in operation by May 1.

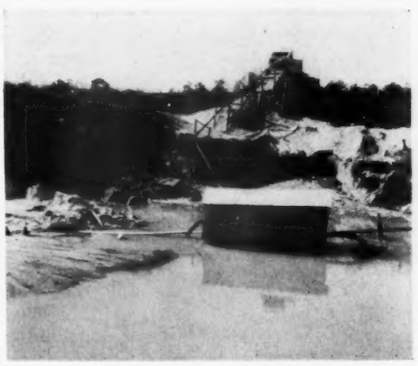
An open ground storage with partitions for the various sizes will be kept filled by a locomotive crane from railroad cars alongside, and the materials will be drawn from this on to a belt conveyor in a concrete tunnel below.

A second inclined belt conveyor will carry them up over a 450-ton capacity steel bin for truck loading or to the bins over the batching and central mixing plant, where trucks may be either dry batched or charged with concrete.

The new plant is designed for two 2-yd. mixers, but only one 2-yd. Lakewood mixer will be used at first in connection with one of the 1-yd. Ransome mixers from the present plant. Heltzel bins will be used and a number of Jaeger dual-mix trucks.

New Sand Plant in Georgia

LATE IN 1930, Brown Bros., Inc., sand producers with headquarters at Howard, Ga., installed a new suction dredge at their deposit near Roberta, Ga. The dredge uses a 6-in. Augusta Iron Works pump, which delivers to a stationary spreader-



New dredge of Brown Bros., Inc., at Alberta, Ga.

screen where any clay balls, trash or weeds, are rejected. The fines pass to two sand cones for production of concrete, masons' and other sands. Most of the product is sold in Georgia. The sand is similar to most of the South Georgia sands, being of high silica content, sharp and with no gravel present at all. Alberta is about 30 miles west of Macon, Ga.

North Carolina Plant Rebuilt

THE B. V. Hedrick Gravel and Sand Co., Lilesville, N. C., recently rebuilt its gravel washing plant near here and is planning to double its present daily capacity of 30 cars per day, in the near future. The system of storage of stock will be reorganized and rearranged by installing several 6-yd. clamshell derricks to increase storage capacity. The company has acquired Cliffside lands of more than 600 acres, increasing gravel acreage to more than 1200 acres; and will install screens, Diesel power plants, derricks and other machinery.

Summer Residents Protest Removal of Connecticut Beach Sand

THAT the sand taken from the beach at Madison, Conn., has a rich commercial value and is being shipped to all parts of the United States and even to China for use as chicken and pigeon grit was news imparted to the legislative judiciary committee at a public hearing recently in the state capitol. Judge W. J. Larkin, of Waterbury, a member of the summer colony at Madison, has asked the legislature to pass a law that would provide a penalty of $100 or imprisonment in jail for 30 days to be imposed on anybody taking sand from the beaches between high and low water mark on Long Island Sound. Beside Judge Larkin, Rep. Frederick L. Coe of Madison and 75 people of the town, including summer cottagers on the beach, approved the proposed law.

Carting Away 350 Tons a Year But Tide Brings in More

Judge Larkin told the committee that 350 tons of sand is taken from the Madison beach annually and carted to Guilford. Some is packed there for shipment as chicken grits and some used in foundry casting processes. Judge Larkin claims that the removal of the sand has been weakening support of sea walls for some time. He admitted that the tides wash in more sand in the excavations made by the sand diggers.

Representative Coe said residents of Madison hand complained to the federal government about removal of the sand from the beach, but were informed that the question was one for action by the State of Connecticut.

Opposition to the proposed anti-sand digging law came from Clinton and Guilford. Former Senator Charles A. Pelton of Clinton spoke against it and offered a substitute bill that would permit owners of the uplands to take all the sand they want from the beach.

Bill Called Unconstitutional and Decisions Cited

Mr. Pelton maintained that the bill was unconstitutional and cited decisions by the supreme court in the case of the Town of Orange against Resnik over water-front rights. Representative J. Harrison Monroe of Guilford, leading a group of Guilford people in opposition to the bill, called it unwise and in his opinion it would increase unemployment in this period of depression.

Representative Epaphroditus Peck of Bristol, a member of the Judiciary Committee, suggested that the real loss, if any, is the bed of the Atlantic Ocean from which he assumed the sand comes and is washed up on the Madison beach.

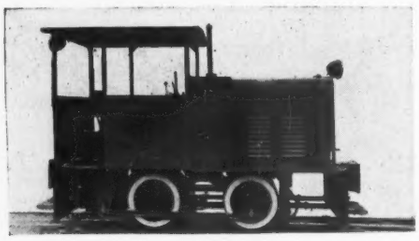
The Lombard & Knowles Co., of Guilford, it was made known, uses the sand for commercial purposes.—*New Haven* (Conn.) *Register.*

New Machinery and Equipment

Oil Locomotive

THIS NEW SMALL Diesel locomotive is being marketed by the Vulcan Iron Works, Wilkes-Barre, Penn. It operates on a 24-in. gage Decauville track, having 25-lb. rails and 3% grades and sharp curves.

The locomotive is powered with a Cummins Diesel engine showing a 48-hp. rating at 1200 r.p.m. governed speed. Engine equipment includes Cuno oil filter, Leece-Neville starting and lighting system, Borg and Beck



Narrow gage Diesel locomotive

clutch, tubular type radiator with guard, etc. Its constant mesh jaw clutch type 4-speed transmission is geared from 2.3 m.p.h. in low to 12 m.p.h. in high speed, with the same range of speeds in reverse.

The locomotive develops a starting tractive power of 3000 lb. and, it is claimed, has a foolproof and highly efficient worm gear driving and reversing arrangement. Traction is secured to front wheels through crank pins and side rods. The driving wheels are 20 in. in diameter with rolled steel tires shrunk on cast iron centers. Axles are of special alloy steel with cast boxes fitted with brass bearings having oil cellars. A 3-point spring suspension of the chassis is employed.

The cab is of the canopy type, and a steel hood protects the engine and other interior details. A sanding system controlled from cab is furnished. A hand type brake is provided, which is claimed to be capable of slipping the wheels with very little effort.

Tests on the builder's tracks lasting approximately three days show the locomotive used less than 5 gal. of oil.

New Reduction Crusher

A NEW REDUCTION CRUSHER, described briefly in the review of new machinery developments in 1930 in the January 3 issue of Rock Products, is being manufactured by the Traylor Engineering and Manufacturing Co., Allentown, Penn.

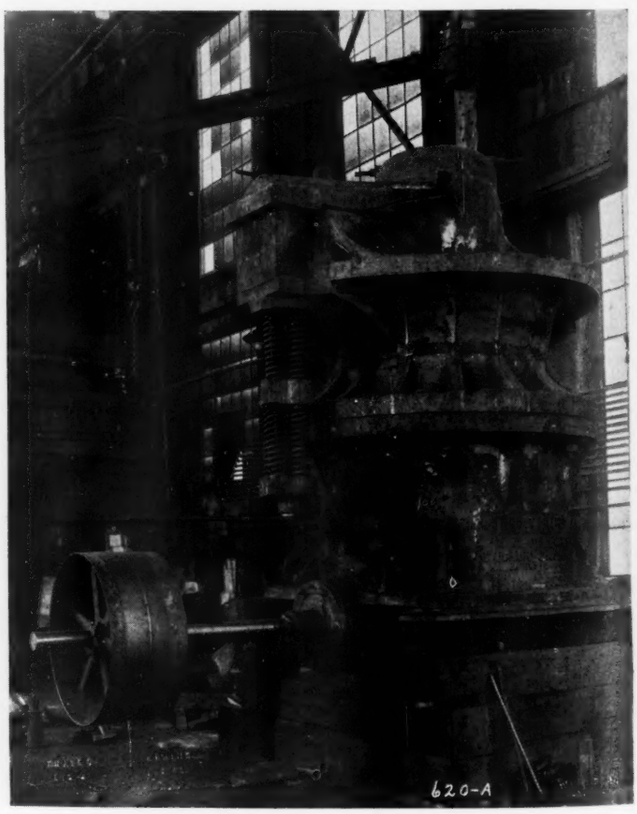
The machine, designated as "Type TZ," is designed of extra heavy proportions and built in six sizes, which, it is claimed, are capable of hourly productions ranging from about 15 tons, ½-in. ring size, for the smallest machine, to nearly 1000 tons 2½-in. ring size for the largest size.

The crusher is of the gyratory type with a bell shaped crushing head, and the concaves are sharply convexed from top to bottom of the bowl. This design, state the manufacturers, eliminates choking because the normal choking point of a standard type gyratory crusher (at the bottom of the head) has been moved upward to a point where the tendency to choke disappears, and results in a higher rate of output and finer and more uniform product with a reduced percentage of undersize.

The machine is designed with a balance lever and tension springs to support the head and shaft, the springs being adjusted to a tension sufficient to withstand the downward thrust of the head due to crushing, and yet to allow the head to be depressed to a liberal degree.

It is claimed that the TZ crusher will receive and crush larger rock than any other cone type secondary reduction machine and that the head may be accurately adjusted, during operation, for varying the size of product. The adjustment range in any one machine is 50%—that is, if the original coarsest setting is 1½-in., the machine may be adjusted to break to ¾-in. or anything between these limits.

No feeder is required for use with the TZ crusher, it is claimed. An important feature connected with the design is that the type of head and concaves used may be installed in any existing gyratory crusher, and may be installed with or without the balance lever and tension springs. The manufacturers state that the effect of converting an old gyratory into a reduction crusher by installing the TZ type of head and concaves is to considerably increase the capacity for a smaller product size, the increase averaging 50% to 75%.

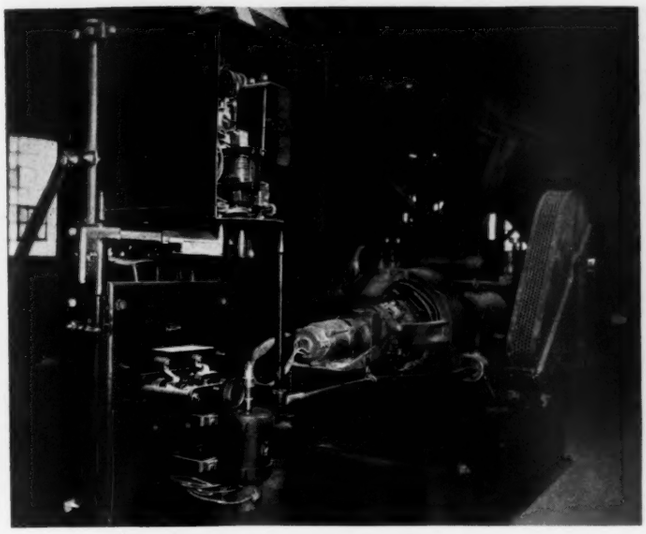


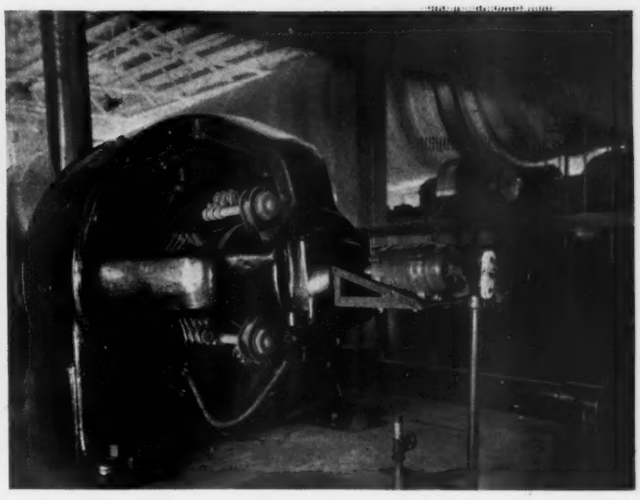
"Chokeless" gyratory reduction crusher

Motor Speeds Synchronized by New Method

EXACT AGREEMENT OF operating speeds of two or more non-synchronous electric motors can now be maintained, it is claimed, by means of a new control system announced by the General Electric Co., Schenectady, N. Y. This system, in which "selsyns" (small self-synchronizing motors) play a fundamental part, is expected to be of great advantage in industrial applications where synchronous operation of different machines or devices is essential.

The first application of the new control system has been made at the Keystone Portland Cement Co.'s plant at Bath, Penn. Its duty there is to maintain the feed of raw material exactly proportional to the speed of the kiln. This is accomplished by holding the speed of the feeder motor in synchronism with the speed of the kiln motor. Thus the rate of slurry feed into the kiln is always proportional to the speed of the kiln, a feature here considered essential to the production of clinker of suitable quality. The kiln and feeder driving motors have





Two views of new synchronized control for slurry feeder

adjustable speeds to operate over a wide range. Changes in speed of the kiln driving motor are controlled by the kiln attendant or "burner."

"Selsyn" generators are mechanically connected to the shafts of the motors driving the kiln and slurry feeding mechanism. When conditions are normal the two generators are in synchronism. A selsyn differential motor has its stator electrically connected to one generator and its rotor to the other. When the generators are in synchronism the selsyn motor has no tendency to rotate. Any deviation in speeds between the two generators will cause the differential motor to rotate forward or reverse, depending on which generator is ahead, the motor speed being equal to the difference between generator speeds. The selsyn motor is geared to a cam that actuates a carbon pile resistor which is connected in the field circuit of the feed motor. The resistance of the carbon pile changes with pressure and thus changes the speed of the feed motor and again establishes a balanced condition.

A single manual control equipment thus governs the two direct-current motors. Adjustments in speed of the kiln drive motor are immediately deflected by exactly proportional changes in speed of the motor driving the feeding mechanism. This system of control, it is stated, by the addition of simple gearing to drive one generator, can also be used to maintain predetermined proportional speed relations between two or more mechanisms driven by non-synchronous electric motors of widely differing speeds.

Improved Gravel and Sand Washers

DURING the past year the Eagle Iron Works, Des Moines, Iowa, has further improved its line of gravel and sand washers by increasing the size of tub and diameter of screw in the single screw machines, and for large capacity requirements is now building double-screw washers, both in the gravel and sand washing types.

Capacities, it is stated, have been increased materially in the single-screw machines by the enlarged tub, while twice the capacity of the single- is obtained in the double-screw washers with economy in space required for installation as compared to a battery of single-screw machines.

Gravel washer has auxiliary attachment for removing shale

On all washers a special mixture semi-steel chilled screw is used, made of unit castings replaceable individually. These are mounted on a 3-in. square shaft which turns in Timken roller and Goodrich cutless rubber bearings. It is claimed that by actual test the rubber bearings have given four to six times the wear of an all-metal packing gland bearing.

To remove objectional shale from gravel the company has perfected an attachment for the Eagle gravel washer. This consists of a double-bottomed chute for feeding the aggregate into the washer which provides a water force that hits the material just as it drops into the washer. This water force kicks over the discharge, the shale which the upward current of wash tends to hold in suspension on account of its slightly lighter than gravel specific gravity. The principle involved is that of skipping flat stones on water, as shale is usually encountered in flat pieces. The gravel washer needs the added impetus of the water current of the shale remover to successfully remove shale.

This device is the result of much experimenting, and by its use much aggregate will pass highway specifications.

The Rock Products Market

Wholesale Prices of Sand and Gravel

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Attica and Franklinville, N. Y.	.75	.75	.75	.75	.75	.75
Boston, Mass.‡	1.15	1.15	1.75	.....	1.75	1.75
Erie, Penn.	.80	1.00	.....	.....	.....	.....
Leeds, Me., Scarbore, Me., and Milton, N. H. (b)	.....	.50	.....	1.75d	1.25	1.00c
Machias Junction, N. Y.	.65	.65	.65	.....	.65	.65
Montoursville, Penn.	1.00	.70	.60	.40	.40	.40
Northern New Jersey	.20– .50	.20– .50	.40–1.00	1.00–1.25	1.00–1.25	.....
Georgetown, D. C.	.55	.55	1.00	1.00	1.00	1.00
Washington, D. C.	.85	.85	1.30	1.30	1.30	1.30
CENTRAL:						
Attica, Ind.			All sizes .75–.85 per ton			
Barton, Wis.	.....	.35	.55	.60	.60	.60
Cincinnati, Ohio	.55	.55	.80	.80	.80	.80
Columbus, Ohio	.65– .95	.30– .75	.50– .75	.50– .75	.50– .75	.....
Crystal Lake, Ill.	.40	.20	.25	.35	.35	.40
Des Moines, Iowa	.40– .70	.40– .70	1.50–1.85	1.50–1.85	1.50–1.85	1.50–1.85
Eau Claire, Wis.	.50	.50	.65	1.00	1.00	.....
Ekhart Lake and Glenbeulah, Wis.	.40	.50	.50	.50	.45	.45
Grand Rapids, Mich.	.....	.50	.70	.70	.70	.70
Greenville, Ohio	.50– .70	.40– .60	.50– .60	.50– .60	.50– .60	.50– .60
Hamilton, Ohio	.65– .75	.65– .75	.65– .75	.65– .75	.65– .75	.65– .75
Hersey, Mich.	.....	.50	.....	.70	.70	.70
Kalamazoo, Mich.	.....	.45	.50	.60	.75	.....
Kansas City, Mo.	.....	.70– .75	.....	1.50	.....	.....
Mankato, Minn.	.....	.45	.....	1.25	1.25	1.25
Mason City, Iowa	.....	.50	.85	1.25	1.25	1.25
Milwaukee, Wis.	.....	.86	.86	.96	.96	.96
Minneapolis, Minn.	.25– .35	.25– .35	1.25–1.35	1.25–1.35	1.25–1.35	1.25–1.35
Oxford, Mich.	.25– .35	.20– .30	.30– .40	.55– .75	.55– .75	.60– .75
St. Louis, Yeatman and Jedburg, Mo., also East St. Louis, Ill.	.60– .75	.45– .85	.50– .90	.20– .90	.20– .90	.50– .90
St. Paul, Minn.	.25	.25	1.15	1.15	1.15	1.15
Terre Haute, Ind.	.75	.75	.75	.75	.75	.75
Urbana, Ohio	.65	.55	.65	.65	.65	.....
Waukesha, Wis.	.....	.45	.60	.60	.60	.60
Winona, Minn.	.40	.40	.50	1.00	1.00	1.00
SOUTHERN:						
Brewster, Fla.	.40	.....	.....	.....	.....	.....
Charleston, W. Va.	.70	1.25	1.25	.....	.....	.....
Eustis, Fla.	.....	.60– .70	.....	.....	.....	.....
Fort Worth, Tex.	1.00	1.00	1.25	1.25	1.25	1.25
Knoxville, Tenn.	.75	.80	.....	.....	1.20	1.20
Roseland, La.	.50	.50	1.10	.85	.85	.....
WESTERN:						
Phoenix, Ariz.	1.25*	1.15*	1.50*	1.15*	1.00*	1.00*
Pueblo, Colo.	.80	.60	.....	1.20	.....	1.15
San Gabriel, San Fernando Valleys, Cal. (a)	.80	.80	1.30	1.30	1.30	1.30
Seattle, Wash.	1.00*	1.00*	1.00*	1.00*	1.00*	1.00*

*Cu. yd. ‡Delivered on job by truck. (a) Discount, 20c per ton if paid by 10th of month following delivery. (b) In carload lots. (c) Gravel, 2½-in. down to ¼-in. (d) ⅝-in. down to ¼-in.

Core and Foundry Sands

Silica sand quoted washed, dried, screened unless otherwise stated; per ton f.o.b. plant.

City or shipping point	Molding, fine	Molding, coarse	Molding brass	Core	Furnace lining	Sand blast	Stone sawing
Albany, N. Y.	2.00	2.00	2.00	.....	.....	.....	.....
Cheshire, Mass.	.....	.....	.....	.....	.....	5.00	.....
Columbus, Ohio	1.50	1.50	.....	.....	.....	3.50	.....
Eau Claire, Wis.	.....	.....	.....	.....	.....	2.00–3.00	.....
Elco, Ill.	Amorphous silica, 90-99½% thru 325 mesh, 10.00–60.00 per ton						
Mendota, Va.	Flint, 8.00–10.00 per ton						
Montoursville, Penn.	.....	.....	.....	1.35–1.60	.....	.....	.....
New Lexington, Ohio	2.50	1.75	.....	.....	.....	.....	.....
Ohlton, Ohio	1.75	1.75	.....	1.75	1.75	1.75	.....
Ottawa, Ill.	.....	.....	.....	.....	.....	3.50b	.....
San Francisco, Calif.	3.50†	5.00†	3.50†	2.50–3.50†	5.00†	3.50–5.00†	.....
South Vineland, N. J.	Washed silica, 1.50 per ton; dry white, 2.00 per ton						

†Fresh water washed, steam dried. *Damp. (a) Filter sand, 3.00. (b) Per ton in bulk; 7:50 per ton in bags.

Miscellaneous Sands

City or shipping point	Roofing sand	Traction
Eau Claire, Wis.	4.30	.....
Ohlton, Ohio	1.75	1.75
San Francisco, Calif.	3.50	3.50

Glass Sand

(Silica sand is quoted washed, dried and screened)

Cheshire, Mass. (in carload lots)	5.00
Klondike, Mo.	2.00
Mendota, Va.	2.50–3.00
Ohlton, Ohio	2.50
South Vineland, N. J.	1.75
San Francisco, Calif.	4.00–5.00

Bank Run Sand and Gravel

Buffalo, N. Y.—Sand, 1/10-in. down, 1.00; ¼-in. down, .85; gravel, all sizes	.75
Burnside, Conn. (sand, ¼-in. and less)	.75*
Crystal Lake, Ill.¶ (½-in. and less)	.30
Fort Worth, Tex.¶ (1½-in. and less, .65; 2-in. and less	.65
Gainesville, Tex.¶ (1½-in. and less)	.55
Grand Rapids, Mich.¶ (1-in. and less)	.50
Hersey, Mich.¶ (½-in. and less, .40; 1-in. and less)	.50
Mankato, Minn.†	.70
Winona, Minn.—Sand, any size	.50–.60
York, Penn.—Sand. 1/10-in. down, 1.10; ¼-in. and less	1.00

*Cu. yd. †Fine sand. 1/10-in. down. ¶Gravel.

ROCK PRODUCTS solicits volunteers to furnish accurate price quotations.

Portland Cement

	F.o.b. city named Per Bag	Per Bbl.	High Early Strength
Albuquerque, N. M.	.79½	3.18	.....
Atlanta, Ga.	.....	†2.00	3.30¶
Baltimore, Md.	.....	†2.02	3.32¶
Birmingham, Ala.	.....	†1.66	2.96¶
Boston, Mass.	.46	†1.84	3.14¶
Buffalo, N. Y.	.45½	†1.82	3.12–3.22¶
Cedar Rapids, Ia.	.....	2.23*	.....
Charleston, S. C.	.....	1.89†	3.19¶
Cheyenne, Wyo.	.58	2.32	.....
Chicago, Ill.	.....	1.79†	3.04¶
Cincinnati, Ohio	.....	1.80†	3.05¶
Cleveland, Ohio	.....	1.80†	3.05¶
Columbus, Ohio	.....	1.80†	3.05¶
Dallas, Tex.	.....	1.79	3.49¶
Davenport, Iowa	.....	2.14*	.....
Dayton, Ohio	.....	1.80†	3.05¶
Denver, Colo.	.60¼	2.41†	3.66¶
Des Moines, Iowa	.47¾	1.91†	3.16¶
Detroit, Mich.	.....	1.85†	3.10¶
Duluth, Minn.	.....	2.04*	.....
Houston, Tex.	.....	1.89–2.00*	3.73¶
Indianapolis, Ind.	.54¾	1.79†	3.04¶
Jackson, Miss.	.....	2.10†	3.40¶
Jacksonville, Fla.	.....	2.33†	3.63¶
Jersey City, N. J.	.....	†1.99	3.29¶
Kansas City, Mo.	.38¾	1.55†	2.80¶
Los Angeles, Calif.	.57½	2.30	.....
Louisville, Ky.	.....	1.94†	3.19¶
Memphis, Tenn.	.....	†2.03	3.33¶
Milwaukee, Wis.	.....	1.94†	3.19¶
Minneapolis, Minn.	.....	2.27*	.....
Montreal, Que.	.....	1.60‖	.....
New Orleans, La.	.....	1.91†	3.21¶
New York, N. Y.	.46	†1.84	3.19¶
Norfolk, Va.	.....	1.97*	3.27¶
Oklahoma City, Okla.	.52	†2.08	3.33¶
Omaha, Neb.	.47½	†1.89	3.14¶
Peoria, Ill.	.....	2.12*	.....
Pittsburgh, Penn.	.....	†1.81	3.11¶
Philadelphia Penn.	.....	†2.01	3.31¶
Portland, Ore.	.60	‡2.40–2.50	.....
Reno, Nev.	.....	2.96‡	.....
Richmond, Va.	.....	†2.18	3.48¶
San Francisco, Calif.	.....	2.24‡	.....
Savannah, Ga.	.....	1.89†	3.19¶
St. Louis, Mo.	.48¾	†1.60	2.85¶
St. Paul, Minn.	.....	2.27*	.....
Seattle, Wash.	.....	1.50–1.55	2.50c
Tampa, Fla.	.....	2.00†	3.30¶
Toledo, Ohio	.....	1.80†	3.05¶
Topeka, Kan.	.44½	1.78†	3.03¶
Tulsa, Okla.	.49¾	1.99†	3.24¶
Wheeling, W. Va.	.....	†1.80	3.10¶
Winston-Salem, N.C.	.....	2.44*	3.74¶

Mill prices f.o.b. in carload lots, without bags, to contractors.

Bonner Springs, Kan.	1.85	3.15¶
Buffington, Ind	1.44†	.....
Concrete, Wash.	2.65	.....
Dallas, Tex.	1.74	.....
Hannibal, Mo.	1.66†	.....
Houston, Tex.	1.84	.....
Hudson, N. Y. (d)	2.21†	3.26¶
Independence, Kan.	1.71†	.....
Leeds, Ala.	1.46†	.....
Limedale, Ind.	1.50	.....
Lime & Oswego, Ore.	2.50	.....
Nazareth, Penn.	2.15	.....
Northampton, Penn.	1.51†	.....
Steelton, Minn.	1.61†	.....
Toledo, Ohio	2.20	.....
Universal, Penn.	1.46†	.....
Waco, Tex.	1.75†	.....

NOTE: Unless otherwise noted, prices quoted are net prices, without charge for bags. Add 40c per bbl. for bags. *Includes dealer and cash discounts. †Includes 10c cash discount. ‡Subject to 2% discount payment 10th of month following invoice date. ¶"Incor" Perfected, prices per bbl. packed in paper sacks, subject to 10c discount 15 days. ‖Includes sales tax. (c) Quick-hardening "Velo," packed in paper bags, 10c discount 10 days. (d) By truck.

Wholesale Prices of Crushed Stone

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.25–1.30	1.25–1.30	1.25–1.30	1.25–1.30	1.25–1.30	1.25–1.30
Chazy, N. Y.	.75	1.60	1.60	1.30	1.30	1.30
Ft. Spring, W. Va.	.35	1.35	1.25	1.15	1.15	1.00
Frederick, Md.	.50–1.00	1.50	1.15–1.50	1.15–1.50	1.05–1.25	1.05–1.25
Oriskany Falls and Munnsville, N. Y.	.50–1.00	.....	.....	1.00–1.35	.....	.....
Prospect Junction, N. Y.	.80	1.10	1.10	1.10	1.10	1.10
Rochester, N. Y.—Dolomite	1.50	1.50	1.50	1.50	1.50	1.50
Hillsville, Penn.	.85	1.35	1.35	1.35	1.35	1.35
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL:						
Alton, Ill.	1.75	.....	1.75	.....	.....	.....
Afton, Mich.	.25	.25	.25	.....	.65	1.50
Cypress, Ill.	1.20	1.10	1.10	1.00	.90	.90
Dubuque, Iowa	1.05	1.05	1.05	1.05	1.05	1.05
Stolle and Falling Springs, Ill.	1.05–1.70	.95–1.70	1.15–1.70	1.05–1.70	1.05–1.70	.....
Greencastle, Ind.	1.25	1.00	.90	.90	.90	.90
Lannon, Wis.	.80	80	.80	.80	.80	.80
Sheboygan, Wis.	1.10	1.10	1.10	1.10	1.10	.....
Stone City, Iowa	.75	.....	1.10	1.00	1.00	1.00f
Toledo, Ohio (a)	1.10	1.60	1.60	1.60	1.60	1.60
Toronto, Canada (j)	2.20	2.20	2.20	2.20	2.20	2.20
Waukesha, Wis.	.....	.90	.90	.90	.90	.90
SOUTHERN:						
Cartersville, Ga.	.75	1.15	1.15	1.10	.75	.....
Chico, Tex.	.50	1.30	1.30	1.25	1.20	.....
El Paso, Tex. (k)	.50	1.25	1.25	1.00	1.00	.....
Olive Hill, Ky.	.50	1.00	1.00	.90	.90	.90
WESTERN:						
Atchison, Kan.	.50	1.80	1.80	1.80	1.80	1.70
Blue Springs and Wymore, Neb. (h)	.25	.25	1.45	1.35c	1.25d	1.20
Cape Girardeau, Mo.	.90	1.25	1.10	1.10	1.00	.....
Rock Hill, St. Louis Co., Mo.	1.30–1.40	1.30–1.40	1.10–1.40	1.30–1.40	1.30–1.40	1.30–1.40

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Birdsboro, Penn.	1.20	1.60	1.45	1.35	.....	1.30
Branford, Conn.	.80	1.70	1.45	1.20	1.05	.....
Bridgeport, Chico and Knippa, Texas.	2.25–2.50	1.80–2.00	1.50–1.60	1.30–1.40	1.20–1.30	1.00–1.25
Duluth, Minn.	1.00	2.25	1.75	1.65	1.35	1.25
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
Farmington, Conn.	1.00	1.30	1.30	1.00	.....	.....
Knippa, Texas	2.50	2.50	2.50	1.20	.....	.....
New Britain, Plainville, Rocky Hill, Middlefield, Meriden, Mt. Carmel, Conn.	.80	1.70	1.45	1.20	1.05	.....
Northern New Jersey	.50	1.25–1.40	1.45–1.80	1.40–1.50	1.40–1.50	.....
Richmond, Calif.	.75	.....	1.00	1.00	1.00	.....
Toronto, Canada (j)	4.80	5.90	4.05	.....	.....	.....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Cayce, S. C.—Granite	.....	.....	1.60	1.60	1.40	.....
Eastern Pennsylvania—Sandstone	1.35	1.70	1.65	1.40	1.40	1.40l
Eastern Pennsylvania—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Lithonia, Ga.—Granite	.60	1.25	1.25	1.15	1.15	.....
Lohrville, Wis.—Granite	1.80	1.60	.....	1.50	1.50	.....
Middlebrook, Mo.—Granite	3.00–3.50	.....	2.00–2.25	2.00–2.25	.....	1.25–3.00
San Gabriel and San Fernando Valleys, Calif. (Granite)	.....	1.30	1.30m	1.30	1.30	1.30
Toccoa, Ga.—Granite	.50	.....	1.25	1.30	1.20	1.20

(a) Screenings, including dust. (c) 1-in., 1.40. (d) 2-in., 1.30. (f) Rip rap. (g) Cu. yd. (h) Rip rap, 1.20–1.40 per ton. (j) Extra charge of 10c per ton for winter delivery; all prices less 5% for payment 15th following month. (k) Roofing gravel, per ton, 1.25. (l) Ballast. (m) ⅞-in. and less.

Crushed Slag

City or shipping point	Roofing	¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:							
Bethlehem, Penn.	1.25–1.50	.50– .60	1.00	.60– .70	.70– .80	.70– .90	.90
Buffalo, N. Y., Erie and Du Bois, Penn.	2.25	1.25	1.25	1.35	1.25	1.25	1.25
Hokendauqua, Penn.	1.50	.60	1.00	.80–1.00	1.00–1.25	1.00–1.25	1.00–1.25
Pittsburgh, Penn.	2.00	1.25	1.25	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	2.05*	1.05*	1.80*	1.45*	1.45*	1.45*	1.45*
Jackson, Ohio	2.05*	.65*	1.55*	1.30*	1.05*	1.30*	1.30*
Toledo, Ohio	1.10	1.00‡	1.10	1.10	1.10	1.10	1.10
SOUTHERN:							
Ashland, Ky.	2.05*	1.05*	1.65*	1.45*	1.45*	1.45*	1.45*
Ensley & Alabama City, Ala.	2.05	.55	1.25	1.15	.90	.90	.80
Longdale, Va.	2.50	1.25	1.25	1.25	1.25	1.15	1.05
Woodward, Ala.†	2.05*	.55*	.....	1.15*	.90*	.90*	.....

5c per ton discount on terms. †1½-in. to ¾-in., 1.05; ⅜-in. to 10 mesh, 1.25*; ⅜-in. to 0-in., 90c*; ¼-in. to 10 mesh, .80*. ‡Including dust.

Agricultural Limestone
(Pulverized)

Alton, Ill.	4.50
Cape Girardeau, Mo.—Analysis, CaCO₃, 94½%; MgCO₃, 3½%; 90% thru 50 mesh	1.50
Cartersville, Ga.	1.75
Davenport, Iowa — Analysis, 92-98% CaCO₃; 2% and less MgCO₃; 100% thru 20 mesh, 50% thru 200 mesh; sacks, per ton	6.00
Gibsonburg, Ohio—Analysis, 55% CaCO₃; 43.40% MgCO₃; bulk, 3.00; in bags	4.50
Hillsville, Penn.—Analysis, 94% CaCO₃, 1.40% MgCO₃, 75% thru 100 mesh; in bags	5.00
Jamesville, N. Y.—Bulk, 3.90; in 80-lb. bags	5.15
Joliet, Ill.	3.50
Knoxville, Tenn.—Analysis, 52% CaCO₃; 36% MgCO₃; 80% thru 100 mesh, in 100-lb. paper bags, 3.75; bulk	2.50
Marion, Va.—Analysis, 90% CaCO₃, 2% MgCO₃; per ton	2.00
Middlebury, Vt.—Analysis, 99.05% CaCO₃; 90% thru 50 mesh	4.25
West Rutland, Vt. — Analysis, 96.5% CaCO₃; 1% MgCO₃; 90% thru 50 mesh; bags, per ton, 3.75; bulk	2.50

Agricultural Limestone
(Crushed)

Bedford, Ind.—Analysis, 98.44% CaCO₃; 0.83% MgCO₃; 90% thru 10 mesh	1.50
Cartersville, Ga.—50% thru 50 mesh, per ton	1.25
Chico, Tex.—Limestone flour, or mill floats, per 100-lb. bag, f.o.b. plant	1.00
Colton, Calif.—Analysis, 95-97% CaCO₃; 1.31% MgCO₃, all thru 14 mesh down to powder	3.50
Cypress, Ill.—90% thru 100 mesh, 1.25; 50% thru 100 mesh, 1.25; 90% thru 50 mesh, 1.25; 50% thru 50 mesh, 1.25; 90% thru 4 mesh, 1.25; and 50% thru 4 mesh	1.25
Davenport, Iowa — Analysis, 92-98% CaCO₃; 2% and less MgCO₃; 100% thru 4 mesh, 50% thru 20 mesh; bulk, per ton	1.10
Dolomite, Calif.—Analysis, 54% CaCO₃; 45% MgCO₃; 99% thru 10 mesh, per ton, 2.10; 49% thru 60 mesh, ¼-in. to dust, per ton	1.70
Dubuque, Ia.—Analysis, 64.04% CaCO₃; 30.54% MgCO₃; 90% thru 50 mesh	1.05
Fort Spring, W. Va.—Analysis, 92% CaCO₃; 3% MgCO₃; 50% thru 50 mesh; bulk, per ton	1.15
Gibsonburg, Ohio—Analysis, 55% CaCO₃; 43.40% MgCO₃; 50% thru 50 mesh	1.25
Lannon, Wis. — Analysis, 54% CaCO₃, 44% MgCO₃; 99% thru 10 mesh; 46% thru 60 mesh	2.00
Screenings (¼-in. to dust)	1.00
Marblehead, Ohio—90% thru 100 mesh	3.00
90% thru 50 mesh	2.00
90% thru 4 mesh	1.00
Marlbrook, Va.—Precipitated lime-marl. Analysis, 96% CaCO₃; 1% MgCO₃, 90% thru 50 mesh, bulk, 2.25; in burlap bags	3.75
Olive Hill, Ky.—90% thru 4 mesh, 50c; 50% thru 50 mesh, per ton	1.00
Branchton, Penn.—100% thru 20 mesh, 60% thru 100 mesh, and 45% thru 200 mesh, per ton	a4.00
Piqua, Ohio—30%, 50% and 99% thru 100 mesh	1.00–4.00
Stolle and Falling Springs, Ill.—Analysis 80.9% CaCO₃, 3.8% MgCO₃; 90% thru 4 mesh	1.15–1.70
Stone City, Ia.—Analysis, 98% CaCO₃; 50% thru 50 mesh	.75
West Stockbridge, Mass.* — Analysis, 95% CaCO₃; 90% thru 50 mesh, bulk 100-lb. paper bags, 4.75; 100-lb., cloth	3.50 5.25
Waukesha, Wis.—90% thru 100 mesh, 3.85; 50% thru 100 mesh	2.10

*Less 25c disc. 15 days. (a) Less 25c disc. per ton.

Pulverized Limestone for Coal Operators

Davenport, Iowa—Analysis, 97% CaCO₃; 2% and less MgCO₃; 100% thru 20 mesh, 50% thru 200 mesh; sacks, ton	6.00
Joliet, Ill.—Analysis, 48% CaCO₃; 42% MgCO₃; 90% thru 200 mesh (bags extra)	3.50
Piqua, Ohio—99% thru 100 mesh, bulk, 3.25; in 80-lb. or 100-lb. bags	4.25
Rocky Point, Va.—Analysis, 97% CaCO₃; 75% MgCO₃; 85% thru 200 mesh, bulk	2.25–3.50
Waukesha, Wis.—90% thru 100 mesh, bulk	4.10

Lime Products

(Carload prices per ton f.o.b. shipping point unless otherwise noted)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Bulk	Ground burnt lime, Bags	Lump lime In bulk	Lump lime In bbl.
EASTERN:								
Berkeley, R. I.	.....	.....	10.50	.....	.....	17.50	.....	19.25
Buffalo, N. Y.	.....	.....	.....	11.00	.....	.....	.....	.....
Cedar Hollow, Devault, Mill Lane, Knickerbocker, Rambo and Swedeland, Penn.	.....	9.00e	9.00e	9.00e	7.50	9.00	8.50	.....
Frederick, Md.	.....	8.50	8.50	8.50	.....	8.50	6.50	13.50
Lime Ridge, Penn.	.....	.....	8.00	.....	6.50	7.50a	4.50	.....
West Stockbridge, Mass.	.....	8.25– 8.75	8.25– 8.75	.....	.....	13.50j	10.00	15.35
CENTRAL:								
Afton, Mich.	.....	.....	.....	.....	.....	10.85	6.50	.....
Cold Springs, Ohio	.....	6.00	6.00	.....	.....	.....	6.00	.....
Martin, Gibsonburg, Marblehead, Tiffin, Ohio, and Huntington, Ind.	7.75	6.00	6.00	11.00	6.00	8.00	6.00	.....
Delaware, Ohio	7.75	6.00	6.00	7.00	6.00	.....	6.00	.....
Luckey, Ohio	7.75	6.00	6.00	.....	.....	.....	.....	.....
Milltown, Ind.	.....	9.00	8.25	9.50	7.50	.....	7.00	.....
Sheboygan, Wis.	.....	10.50	10.50	.....	.....	.....	9.50	20.00h
White Rock, Ohio	7.75	.....	6.00	.....	6.00	8.00	6.00	.....
Woodville, Ohio	7.75	6.00	6.00	9.00	6.00	.....	6.00	15.00f
SOUTHERN:								
Keystone, Ala.	.....	8.00	.....	7.50	.....	.....	6.50	13.75
Ocala, Fla.	17.25	10.00	10.00	11.00	.....	.....	10.50	1.50
Knoxville, Tenn.	.....	8.00	8.00	7.50	.....	.....	6.00k	12.50
Pine Hill, Ky.	.....	8.00	8.00	7.50	.....	.....	6.00k	12.50
WESTERN:								
Little Rock, Ark.	.....	14.30	.....	14.30	.....	.....	.....	17.40
Kirtland, N. M.	.....	.....	.....	.....	.....	.....	15.00	.....
Los Angeles, Calif.	15.50	14.50	.....	.....	.....	.....	16.00	.....
San Francisco, Calif. (d)	20.00	20.00	12.00	20.00	.....	.....	.....	.....
San Francisco, Calif.	19.00	14.00–17.00	12.50	14.00–19.00	14.50c	.....	11.00b	.....

(a) In 100-lb. bags. (b) To 14.50. (c) Also 13.00. (d) Woodburnt lime: finishing hydrate, 20.00 per ton; pulv. lime, 2.00 per iron drum. Oil-burnt pulv. lime, 13.00–14.50 per ton. (e) In 50-lb. paper. (f) In steel; in wood, 14.00. (g) In 80-lb. paper bags. (h) In steel. (i) For chemical purposes. (j) To 17.50. (k) To 6.50. *Price to dealers.

Wholesale Prices of Slate

Prices given are f.o.b. at producing point or nearest shipping point

Slate Flour

Pen Argyl, Penn.—Screened, 200-mesh, 6.00 per ton in paper bags

Slate Granules

Esmont, Va.—Blue, 7.50 per ton.
Granville, N. Y.—Red, green and black, 7.50 per ton.
Pen Argyl, Penn.—Blue-black, 6.00 per ton in bulk.

Roofing Slate

City or shipping point	Prices per square—Standard thickness 3/16-in.	¼-in.	⅜-in.	½-in.	¾-in.	1-in.
Bangor, Penn.—						
Gen. Bangor No. 1 clear	10.00–14.00	20.00	25.00	29.00	40.00	50.00
Gen. Bangor No. 1 ribbon	9.00–10.25	16.00	20.00	25.00	35.00	46.00
No. 1 Albion	7.25–10.50	16.00	23.00	27.00	37.00	46.00
Gen. Bangor No. 2 ribbon	6.75– 7.25	.....	.....	.....	.....	.....
Chapman Quarries, Penn.— Hardvein slate	8.00–11.00	13.50	20.00	25.00	30.00	35.00
Granville, N. Y.—						
Sea green, weathering	14.00	24.00	30.00	36.00	48.00	60.00
Semi-weathering, green & gray	15.40	24.00	30.00	36.00	48.00	60.00
Mottled purple & unfading gr'n	21.00	24.00	30.00	36.00	48.00	60.00
Red	27.50	33.50	40.00	47.50	62.50	77.50
Pen Argyl, Penn. Graduated slate	.....	16.00	23.00	27.00	37.00	46.00

Albion blue-grey roofing slate, No. 1 clear, 7.25–10.50; mediums, 8.00–9.00; No. 1 ribbon, 8.00–8.50

(a) Prices are for standard preferred sizes (standard 3/16-in. slates), smaller sizes sell for lower prices.
(b) Prices other than 3/16-in. thickness include nail holes.
(c) Prices for punching nail holes, in standard thickness slates, vary from 50c to $1.25 per square.

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Chatsworth, Ga.:
- Crude talc, per ton 5.00
- Ground talc (20-50 mesh), bags 6.50
- Ground talc (150-200 mesh), bags 9.00
- Pencils and steel crayons, gross 1.50– 2.00

Chester, Vt.—Finely ground talc (carloads), Grade A—99-99¾% thru 200 mesh, 8.00–8.50; Grade B, 97-98% thru 200 mesh 7.00– 7.50
1.00 per ton extra for 50-lb. paper bags; 166⅔-lb. burlap bags, 15c each; 200-lb. burlap bags, 18c each. Credit for return of burlap bags. Terms 1%, 10 days.

Clifton, Va.:
- Ground talc (150-200 mesh), in bags 10.00

Emeryville, N. Y.:
- Ground talc (200 mesh), bags 13.75
- Ground talc (325 mesh), in bags 14.75

Hailesboro, N. Y.:
- Ground talc (300-350 mesh), in 200-lb. bags 15.50–20.00

Henry, Va.:
- Crude (mine run), bulk 3.50– 4.00
- Ground talc (150-200 mesh), in bags .. 6.25–11.00

Joliet, Ill.:
- Ground talc (200 mesh), in bags:
  - California talc 30.00
  - Southern talc 20.00
  - Illinois talc 10.00

Los Angeles, Calif.:
- Ground talc (150-200 mesh), in bags .. 15.00–25.00

Natural Bridge, N. Y.:
- Ground talc (325 mesh), bags 10.00–15.00

Rock Phosphate

Prices given are per ton (2240 lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

Gordonsburg, Tenn. 4.25– 4.75
Mt. Pleasant, Tenn.:
- B.P.L. 78%, furnace lump 6.25
- B.P.L. 72%, run of plant lump & fines 5.00

Ground Rock
(2000 lb.)

Gordonsburg, Tenn. 5.25– 6.00
Mt. Pleasant, Tenn.—(Lime phosphate) —B.P.L. 75%; per ton, bags extra 12.80
Mt. Pleasant, Tenn.—B.P.L. 72% 5.00– 5.50

Florida Phosphate

(Raw Land Pebble)

Mulberry, Fla.—Gross ton, f.o.b. mines
- 68/66% B.P.L. 3.15
- 70% minimum B.P.L. 3.75
- 72% minimum B.P.L. 4.25
- 75/74% B.P.L. 5.25
- 77/76% B.P.L. 6.25

Mica

Prices given are net, f.o.b. plant or nearest shipping point.

Rumney Depot, Bristol and Cardigan, N. H.—Per ton:
- Punch mica, per ton 150.00–240.00
- Mine scrap 22.50
- Mine run 325.00
- Clean shop, scrap 25.00
- Roofing mica 37.50
- Ground mica, per ton, 20 mesh, 37.50; 40 mesh, 40.00; 60 mesh, 40.00; 100 mesh, 45.00; 200 mesh 60.00

Spruce Pine, N. C.—Mine scrap, per ton 18.00– 20.00

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F.O.B. MILL

City or shipping point	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gaging Plaster	Wood Fiber	Gaging White	Plaster Sanded	Cement Keene's	Finish Trowel	—Plaster Board— ¼x32x 36". Per M Sq. Ft.	⅜x32x 36". Per M Sq. Ft.	Wallboard, ⅜x32 or 48" Lengths 6'-10'. Per M Sq. Ft.
East St. Louis, Ill.—Special Gypsum Products—Partition section, 4 in. thick, 12 in. wide, and up to 10 ft. 3 in. long, 12c per ft., 21.00 per ton; outside wall section and interior bearing wall section, 6 in. wide, 6 in. thick, and up to 10 ft. 3 in. long, 25c per ft., 30.00 per ton; floor section, 7 in. thick, 16 in. wide, and up to 13 ft. 6 in. long, 17c per ft., 23.00 per ton.													
Grand Rapids, Mich.	.....	.....	6.00b	10.00b	10.00b	10.00b	19.50b	8.00b	26.00b	21.00b	15.00	15.00	27.00
Los Angeles, Calif. (a)	.....	7.50	7.50	12.20	12.20	.....	13.20	.....	29.00	.....	.....	.....	.....
Medicine Lodge, Kan.	1.40	.....	.....	.....	.....	.....	11.50b	.....	16.00b	11.50b	.....	.....	.....
Oakfield, N. Y.	.....	.....	.....	6.00	9.00b	9.00b	.....	6.00b	.....	.....	.....	.....	.....
Port Clinton, Ohio	4.00	6.00–8.00	6.00–8.00	10.00p	10.00q	10.00q	20.00k	8.00–11.00	24.50f	26.00g	15.00h	15.00h	27.00j
Rumford, R. I. (n)	.....	.....	.....	14.00m	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Francisco, Calif.	.....	.....	.....	.....	14.90b	.....	.....	.....	.....	.....	.....	.....	.....
Winnipeg, Man.	5.00	5.00	7.00	13.00	14.00	14.00	——	——	——	——	20.00	25.00e	33.00d

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable). (a) ⅜-in. plaster lath, 16c per sq. yd. (b) Includes paper bags. (c) Includes jute sacks. (d) "Gyproc," ⅜x48-in. by 5 and 10 ft. long. (e) ⅜x48-in. by 3 to 4 ft. long. (f) To 27.50. (g) To 29.00. (h) To 16.00. (j) To 28.00. (k) To 23.00. (m) In jute sacks, delivered in Providence, R. I. (n) Gypsum block, 2-in., 6c per foot; 3-in., 7c per foot. (p) To 12.00. (q) To 13.00.

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Brandon, Vt.—English pink, cream and coral pink	¶12.50–‖14.50	¶12.50–‖14.50
Cranberry Creek, N.Y.—Bio-Spar, per ton in bags, in carload lots, 9.00; less than carload lots, per ton in bags		12.00
Crown Point, N. Y.—Mica Spar		¶9.00–‖12.00
Davenport, Ia.—White limestone, in bags, ton	‖6.00	‖6.00
Los Angeles, Calif.—(e) White	¶12.00–‖14.50	¶12.00–‖14.50
Snowflake		¶12.00–‖14.50
Golden, browns, grey, blues, blacks	¶16.00–‖18.50	¶16.00 ‖18.50
Dolomite, Calif. (Lone Pine)—(e) White	¶9.80– ‖9.80	¶9.80– ‖9.80
Snowflake		¶9.80– ‖9.80
Golden, browns, grey, blues, blacks	¶13.80–‖13.80	¶13.80–‖13.80
Middlebrook, Mo.—Red		20.00– 25.00
Middlebury, Vt.—White		¶9.00–‖10.00
Middlebury & Brandon, Vt.—Caststone, per ton, including bags		c5.50
Randville, Mich.—Crystalite, crushed white marble, bulk	4.00	4.00– 7.00
Tuckahoe, N. Y.	6.00	
Warren, N. H. (d)		¶8.00– 8.50

¶C.L. ‖L.C.L. (a) Including bags. (b) In burlap bags, 2.00 per ton extra. *Per 100 lb. (c) Per ton f.o.b. quarry in carloads; 7.00 per ton L.C.L. (d) L.C.L., 9.50-15.00 per ton in 100-lb. bags (e) Including bags.

Art and Cast Stone Aggregates

Los Angeles, Calif.—Dolomite aggregates, all sizes and colors† ¶10.00 ‖12.50
Dolomite special cast stone, wet cast aggregate, white, ¼-in. to dust a4.70
† 100-lb. sacks. ¶C.L. ‖L.C.L. (a) In open cars.

Chicken Grits

Cypress, Ill.—(Agstone), per 100-lb. sack .90
Chico, Tex.—Hen size and Baby Chick, packed in 100-lb. sacks, per 100-lb. sack, f.o.b. Chico 1.00
Davenport, Iowa—High calcium carbonate limestone, in bags, L.C.L., per ton 6.00
El Paso, Tex.—(Limestone), per 100-lb. sack .75
Gibsonburg, Ohio—(Agstone) 10.00
Joliet, Ill.—(Agstone) 10.00
Los Angeles, Calif.—(Gypsum), per ton, including sacks 7.50– 9.50
Marble grits, per ton, incl. sacks 10.00–12.50
Middlebury, Vt.—Per ton (a) 10.00
Piqua, Ohio—(Pearl grit), No. 1 and No. 2 1.00– 4.00
Port Clinton, Ohio—(Gypsum), per ton 6.00
Randville, Mich.—(Marble), per ton, bulk 6.00
Warren, N. H. 8.50– 9.50
Waukesha, Wis.—(Limestone), per ton 7.00
West Stockbridge, Mass. ¶7.50–‖9.00
(a) F.o.b. Middlebury, Vt. ¶C.L. ‖L.C.L.

Cement Drain Tile

Grand Rapids, Mich.—Drain tile, per 1000 ft.

4-in.	40.00	15-in.	325.00
5-in.	50.00	18-in.	450.00
6-in.	75.00	20-in.	600.00
8-in.	110.00	22-in.	750.00
10-in.	165.00	24-in.	850.00
12-in.	190.00		

Longview, Wash.—Drain tile, per foot

3-in.	.06	8-in.	.18
4-in.	.08	10-in.	.25
6-in.	.12	12-in.	.35

Granular Glasspar

(Chemically Controlled)

Spruce Pine, N. C.—Color, white; analysis, K_2O, 7.20%; Na_2O, 3.70%; SiO_2, 70%; Fe_2O_3, 0.05%; Al_2O_3, 17.50%; per ton, in bulk 10.50

Soda Feldspar

De Kalb Jct., N. Y.—Color, white; pulverized (bags extra, burlap 2.00 per ton, paper 1.20 per ton); 99% thru 140 mesh, 16.00; 99% thru 200 mesh 18.00
Spruce Pine, N. C.—(Chemically controlled.) Color, white; 200 mesh; analysis, K_2O, 5.50%; Na_2O, 5.50%; SiO_2, 68.80%; Fe_2O_3, 0.10%; Al_2O_3, 18.60%; per ton, in bulk 18.00

Potash Feldspar

Erwin, Tenn.—White; analysis, K_2O, 10.50%; Na_2O, 2.75%; SiO_2, 67.75%; Fe_2O_3, .08%; Al_2O_3, 18.00%, pulverized, 98% thru 200 mesh, in bags, 16.00; bulk 15.00
Crude, in bags, 7.50; bulk 6.50
Spruce Pine, N. C.—(Chemically controlled.) Color, white; 200 mesh; analysis, K_2O, 11.30%; Na_2O, 2%; SiO_2, 67%; Fe_2O_3, 0.10%; Al_2O_3, 18.60%; per ton, in bulk 15.00
Trenton, N. J.—Color, white; analysis, K_2O, 12%; Na_2O, 3%; SiO_2, 69%; Fe_2O_3, 0.06%; Al_2O_3, 18%; pulverized, 98% thru 200 mesh; bulk, 20.00; in bags 21.20
West Paris, Me.—(Chemically controlled.) Color, white; 200 mesh; analysis, K_2O, 11.20%; Na_2O, 3.20%; SiO_2, 65.70%; Fe_2O_3, 0.09%; Al_2O_3, 19.20%; per ton, in bulk 19.00
Rochester, N. Y.—Color, white; analysis, K_2O, 12.50%; Na_2O, 2.25%; SiO_2, 65%; Fe_2O_3, 0.04%; Al_2O_3, 19.10% pulverized 98% thru 200 mesh; in bags, 23.50; bulk 22.00

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point.

Beloit, Wis.:		
4x8x16. Each		.11
6x8x16. Each		.13
8x8x16. Each		.15
10x8x16. Each		.19
12x8x16. Each		.21
Brookville, Penn.: 8x8x16	20.00§–23.00a	
8x10x16	25.00§–28.00a	
Camden, N. J.: 8x8x16, each		.18b
Chicago, Ill.:		
8x8x16. Each		.17§
8x8x16. Each		.20a
Columbus, Ohio: 8x8x16	14.00§–16.00‡	
Graettinger, Iowa	.18– .20	
Indianapolis, Ind.	.10– .12‡	
Lexington, Ky.:		
8x8x16	‡18.00*	
8x8x16	†16.00*	
Los Angeles, Calif.:		
4x8x12	4.50*	
4x6x12	3.90*	
4x4x12	2.90*	
Omaha, Neb.: (c)		
8x 4x16, each	.06½§	
8x 8x16, each, .10§; 8x12x16, each	.15§	
Oak Park, Ill.:		
8x8x16, per 1000	160.00	
Passaic, N. J.: 8x8x16 in. Each	.16	
12x8x16 in. Each	.24	
Pittsburgh, Penn. (Prices at yard)		
8x 8x16. Each		.17§
8x 8x16. Each		.19a
8x12x16. Each		.20§
8x12x16. Each		.22a
Wichita, Kan.: 8x8x16. Each		.11§

*Price per 100 at plant.
†Rock or panel face.
‡Face. §Plain. (a) Rock face. (b) Less 10%. (c) Faced block, priced 2c higher than plain block prices quoted.

Cement Roofing Tile

Prices are net per square, carload lots, f.o.b. nearest shipping point, unless otherwise stated.

Cicero, Ill.—French and Spanish tile, 9x15-in., per sq.	9.50–12.00
Closed end shingle, 8½x12½ in., per sq.	11.00–13.00
Indianapolis, Ind.—9x15-in.	Per sq.
Gray	10.00
Red	11.00
Green	13.00
New Castle, Penn.—Red, 9x15-in.	12.00
Green, 9x15-in.	15.00
New York City, N. Y.:	
Red, per square	10.00–12.00
Green, per square	12.00–15.00

Cement Building Tile

Oak Park, Ill. (Haydite):	
8x 8x16, per 100	20.00
Lexington, Ky.:	
5x8x12, per 1000	55.00
4x5x12, per 1000	35.00
Longview, Wash. (Stone Tile):	
4x6x12, per 1000	60.00
4x8x12, per 1000	70.00
Prairie du Chien, Wis.:	
5x8x12, per 1000	78.00
5x4x12, per 1000	46.00
5x8x6, per 1000	41.00

Wichita, Kan.: (Duntile)	Plain	Glazed
8x8x12. Each	.10½	.14
6x8x12. Each	.09½	.13
4x5x12. Each	.05	.08
4x4x12. Each	.04½	.07½

Concrete Brick

Prices given per 1000 brick, f.o.b. plant.

	Common	Face
Beloit, Wis.	18.00	26.00– 35.00
Oak Park, Ill., "Haydite"	16.00	
Ensley, Ala., "Slagtex"	12.50	
Longview, Wash.	16.50	22.50– 45.00
Milwaukee, Wis.	14.00	20.00– 35.00
Omaha, Neb.	15.00	
Prairie du Chien, Wis.	14.00	22.00– 25.00
Rapid City, S. D.	16.00	30.00

*Price f.o.b. plant. †Delivered on job in city.

Fullers Earth

Prices per ton in carloads, f.o.b. Florida shipping points. Bags extra and returnable for full credit.

16– 30 mesh	20.00
30– 60 mesh	22.00
60–100 mesh	18.00
100 mesh and finer	9.00
Joliet, Ill.—All passing 100 mesh, f.o.b. Joliet, incl. cost of bags	24.00

Stone-Tile Hollow Brick

Prices are net per thousand, f.o.b. plant.

	No. 4	No. 6	No. 8
Albany, N. Y.*†	40.00	60.00	70.00
Asheville, N. C.	35.00	50.00	60.00
Atlanta, Ga.	29.00	42.50	53.00
Brownsville, Tex.		53.00	62.50
Brunswick, Me.†	40.00	60.00	80.00
Charlotte, N. C.	35.00	45.00	60.00
De Land, Fla.	30.00	50.00	60.00
Farmingdale, N. Y.	37.50	50.00	60.00
Houston, Tex.	35.00	45.00	60.00
Jackson, Miss.	45.00	55.00	65.00
Klamath Falls, Ore.	65.00	75.00	85.00
Longview, Wash.		55.00	64.00
Los Angeles, Calif.	29.00	39.00	45.00
Mattituck, N. Y.	45.00	55.00	65.00
Medford, Ore.	50.00	55.00	70.00
Memphis, Tenn.	50.00	55.00	65.00
Mineola, N. Y.	45.00	50.00	60.00
Nashville, Tenn.	30.00	49.00	57.00
New Orleans La.	35.00	45.00	60.00
Norfolk Va.	35.00	50.00	65.00
Passaic, N. J.	40.00	52.50	70.00
Patchogue, N. Y.		60.00	70.00
Pawtucket, R. I.	35.00	55.00	75.00
Safford, Ariz.		32.50	48.75	65.00
Salem, Mass.	40.00	60.00	75.00
San Antonio, Tex.	37.00	46.00	60.00
San Diego, Calif.	35.00	44.00	52.50

Prices are for standard sizes—No. 4, size 3½x4x12 in.; No. 6, size 3½x6x12 in.; No. 8, size 3½x8x12 in. *Delivered on job. †10% discount.

Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted

Culvert and Sewer	4-in.	6-in.	8-in.	10-in.	12-in.	15-in.	18-in.	20-in.	22-in.	24-in.	27-in.	30-in.	36-in.	42-in.	48-in.	54-in.	60-in.
Grand Rapids, Mich. (b)																	
Sewer	.....	.12	.18–.20	.27½	.35	.57½	1.00	1.11	1.48	1.66	.....	.....	.....	.....	.....	.....	.....
Culvert	.....	.....	.....	.57	.67	.93	1.20	.....	1.48	1.80	2.10	2.25	3.35	4.00	5.10	5.85	7.42
Indianapolis, Ind. (a)	.....	.....	.....	.75	.85	.90	1.15	.....	.....	1.60	.....	2.50	.....	.....	.....	.....	.....
Longview, Wash.	.17½	.24½	.30	.42	.60	.90	1.26	.....	.....	2.16	.....	3.60	4.50	5.50	6.50	7.50	.....
Mercedes, Texas																	
Tongue and groove	.16	.20	.23	.29	.35	.....	.74	.91	.....	1.38	.....	2.28	.....	.....	.....	.....	.....
Sewer	.16	.22	.32	.41	.53	.78	1.05	.....	.....	1.98	.....	.....	.....	.....	.....	.....	.....
Milwaukee, Wis.	Cast stone window sills, 5 in. x 5½ in., 50c per lineal ft.																
Newark, N. J. (d)	.....	.....	.....	.....	.90	1.15	1.50	.....	.....	1.85	2.35	2.76	3.77	4.93	6.21	7.66	9.28
Unreinforced	.....	.16	.25	.37	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Norfolk, Neb.	.....	.....	.....	.90	1.00	1.13	1.42	.....	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Tiskilwa, Ill. (e)	.....	.....	.....	.75	.85	.95	1.20	1.60	.....	2.00	.....	2.75	3.40	.....	6.50	.....	10.00
Wahoo, Neb. (c)	.....	.....	.....	.....	.85½	.....	1.14	.....	.....	1.81	.....	2.47	3.42	4.13	5.63	6.49	7.31

†21-in. diam. (a) 24-in. lengths. (b) Sewer, 21-in., 1.29; culvert, 21-in., 1.45. (c) Reinforced, 15.40 per ton, f.o.b. plant (d) Reinforced, 21-in., 1.69; unreinforced, 21-in., 1.26; 5% cash discount. (e) Reinforced.

Recent Prices Bid and Contracts Let

Syracuse, N. Y.—Cement on cars in Syracuse was quoted at an average $2.45 as compared with $2.65 in December and early in the year.

The product in cloth bags runs $2.65 a barrel and in paper bags $2.35, four bags to the barrel, 150 to 200 bbl. to the car.

The present low price represents a decline of about 40% from the post war peak of $4 a barrel.

The present level is about the same as in a cement trade price war in 1929. The new war is between cement manufacturers with different plans of dealer relationships.

The annual consumption of cement in Syracuse is rated at about 300,000 to 350,000, or 400,000 bbl. for the county. The New York Central grade crossing elimination job is estimated to require about the equivalent of a year's consumption here, but it will be spread over several years and the average for the county will be about 50,000 bbl. a year.

At the reduced rate there is a saving of about $100,000 on the year's cement bill here. Customers are protected under cement-buying contracts, which provide generaliy for charges at prices prevailing at the time of delivery if any decline has intervened.—*Syracuse* (N. Y.) *Herald.*

* * * * *

Milwaukee, Wis.—Officials of the Milwaukee board of purchases, who anticipated an increase in prices of gravel, sand and crushed stone purchased by the city this year, have found that their fears were groundless. The same prices as prevailed last year have been quoted the board on 1931 supplies.

Members of the board voted to renew contracts with individual dealers and with the Material Dealers' Co-Operative Association.

The price of sand is $1.75 a cu. yd. Gravel was quoted at $1.90 and crushed rock was purchased at prices ranging from $1.85 to $2.

* * * * *

Belvidere, N. J.—Contracts for washed pea gravel to be delivered in piles on various county roads were awarded to Gallo Sand and Gravel Co. at Netcong, to be delivered as follows: Blairstown, 831 tons; Johnsonburg, 1818 tons; Bridgeville, 407 tons; Washington, 624 tons; Belvidere, 829 tons, at $1.60; Great Meadows, 1391 tons, at $1.30, and Allamuchy, 905 tons, at $1.50.

To North Jersey Sand and Stone Co., Carpentersville, Delaware, 100 tons, at $1.90; Broadway, 428 tons, at $1.35; Martin's Creek, 35 tons, at $1.50; Stewartsville, 544 tons, at $1.30, and Riegelsville, 126 tons, at $1.30.

To Frank H. Smith, Hackettstown: Hackettstown, 558 tons, at $1.35; Port Murray, 411 tons, at $1.50.

To Trimmer Sand and Gravel Co., Middle Valley, 750 tons 2½-in. broken stone at $2 and 188 tons screenings, grade A, at $2.

To Clarence Warne, Broadway, 750 tons 2½-in. broken stone, at $2, and 188 tons screenings, grade A, at $2.—*Easton* (Penn.) *Express.*

* * * * *

Akron, Ohio—Contract for 700 bbl. of cement, at $2.05 per bbl., was let to Botzum Bros., W. E. Wright Co., Builders Supply Co. and J. P. Loomis Coal and Supply Co.

Stuver Bros. got a contract for 500 tons of sand at $1.05 a ton.

Contract for 2000 tons of limestone, truck delivery, went to W. E. Wright Co. at $1.70 per ton, while contract for a like amount in carload lots at $1.19 a ton went to the Wagner Quarries.—*Akron* (Ohio) *Beacon-Journal.*

* * * * *

Detroit, Mich.—The common council voted unanimously to award the contract for the 1931 supply of crushed stone, binder stone and slag to the France Stone Co., in accordance with the recommendation of Douglas Dow, commissioner of purchases and supplies. The contract had been the subject of controversy in the council for several weeks, and the unanimous vote came as a surprise.

Commissioner Dow informed the council that the single bid of the France company for $1.66 a ton was the lowest submitted. Corporation Counsel Clarence E. Wilcox held that the bid of the Lake Port Supply Co., another bidder, did not comply with specifications.

The council held a special meeting before the regular session and at that time the committee was evenly divided on awarding the contract. Fifteen minutes later the vote was unanimous.—*Detroit* (Mich.) *Free Press.*

* * * * *

Midland, Mich.—Contracts for the purchase of gravel at 15 c. a cu. yd. from three Midland county men have been approved by the County Road Commission. The agreements cover a term of six years, and are in line with the policy adopted by the body some months ago of purchasing gravel locally.

The sale of the old gravel plant owned by the Commission of Lake county was made February 17 through a manufacturing concern from which the road men expect to purchase a larger outfit needed for local use. The old plant, consisting of screen, track, elevator and stone crusher, was purchased in order to utilize Midland county gravel, which otherwise contained too high a percentage of oversized stone.

The three contracts completed this week were with Henry Mashue of Lee, John Noykos of Homer and John Holden of Midland.—*Midland* (Mich.) *Republican.*

* * * * *

Le Grande, Ia.—A price reduction of 25c per ton on agricultural limestone has been announced by a representative of the Le Grande Limestone Co., who called at the Farm Bureau office.

All limestone will be billed at 95c per ton at the quarry with a 25c per ton refund to Farm Bureau members through the local Farm Bureau office.—*Guthrie Center* (Ia.) *Times.*

* * * * *

Chicago, Ill.—A game of tug-o-war, with the cement dealers is being played by the Cook county board. This became apparent recently when the board for the second time this year rejected bids for 750,000 bbl. of cement for 1931 highway projects.

The object is to force down the price. So far, points have been scored by the county. First bids, rejected several weeks ago, averaged $2.11. The second bids were 10c lower.

Major George A. Quinlan, superintendent of county highways, recommended the rejection of the second bids in the belief that the dealers will offer lower prices.

Commissioners Dan Ryan and Maurice Kavanagh charged that a "price trust" existed in the cement trade. Major Quinlan, however, took issue with them on that.

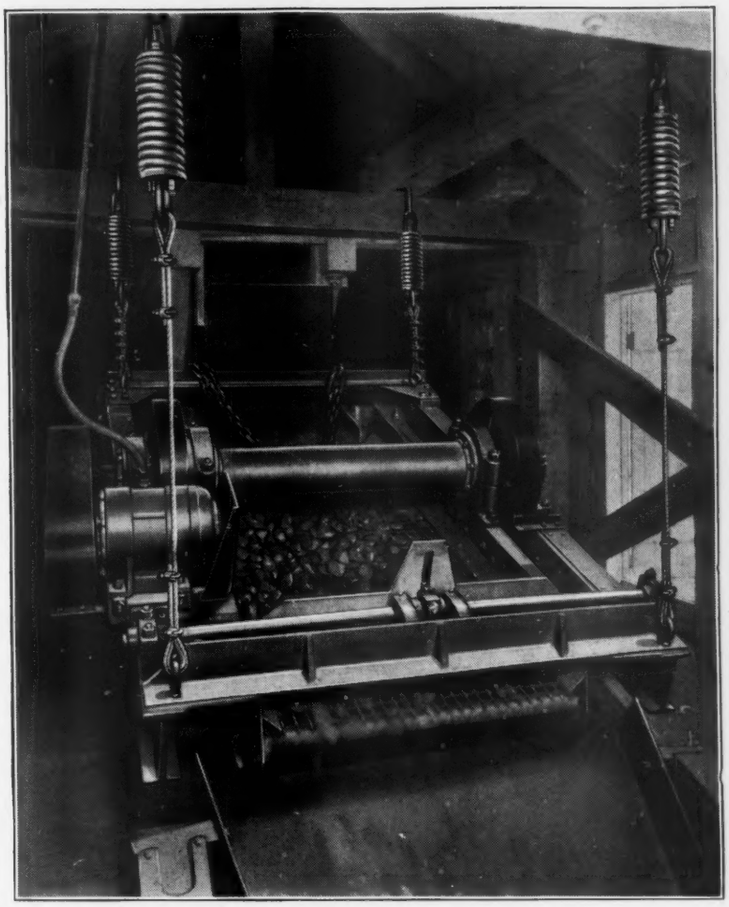
"What has happened in the last few weeks shows that if there was a price combine, there is none now," he said. "That's why I think we can get still better prices."

He pointed out that the first bids were rejected because the state highway department, in the market for 6,000,000 bbl., obtained better prices. Then, after cement dealers gave the county a lower price than the state was offered, the state rejected its bids.—*Chicago* (Ill.) *Herald-Examiner.*

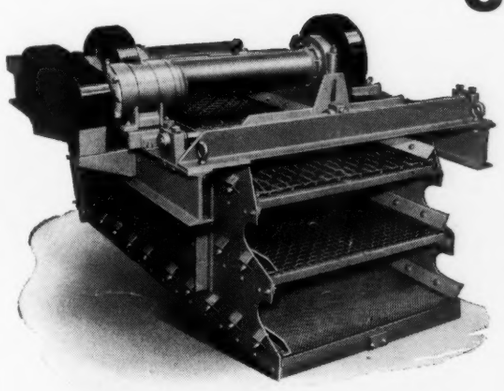
* * * * *

Indianapolis, Ind.—Allotments to cement companies for supplying cement this year for road construction, have been made by the Indiana Highway Commission. Fifteen companies from Ohio, Illinois, Michigan, Kentucky and Indiana submitted bids and in making the allotments, the commission divided the business among the companies which were the low bidders. Four Indiana companies share in the business. The commission advertised for bids for 1,750,000 bbl. of standard cement and 20,000 bbl. of high-early-strength cement. The net price a barrel delivered will average $1.36 as contrasted with $1.65 last year.

The allotments are: Lone Star Cement Co., Indiana, Limedale, 650,000 bbl. of standard and 20,000 bbl. of high-early-strength; Universal-Atlas Cement Co., of Bluffington, 475,000 bbl.; Lehigh Portland Cement Co., of Mitchell, 325,000 bbl.; Medusa Portland Cement Co., of Sandusky, Ohio, 75,000 bbl.; Louisville Cement Co., of Speeds, Ind., 100,000 bbl.; Southwestern Portland Cement Co., of Osborne, Ohio, 10,000 bbl.; Kosmos Portland Cement Co., of Kosmosdale, Ky., 25,000 bbl.; Wabash Portland Cement Co., of Stroh, 25,000 bbl., and Marquette Cement Manufacturing Co., of La Salle, Ill., 40,000 bbl.



Positive Mechanically Produced Motion—equal over entire screen surface



Allis-Chalmers vibrating screens are built with one, two and three decks in sizes 3′ x 6′ and 4′ x 8′ to suit conditions of operation.

. . . . The result, large capacity and a clean product. Allis-Chalmers Vibrating Screens have self-aligning, anti-friction bearings with positive dust seals, alemite lubricated; large eccentric shafts; and all rotating parts fitted with safety guards. The vibrating mechanism can be removed without disturbing the screen body or supporting frame. Screen sections are easily changed and are reversible, end for end. They are also interchangeable. The screening angle is adjustable. Centrifugal Vibrating Screens are built with single, double or triple decks. The liberal clearance between decks facilitates spouting and the changing of screen surfaces. . . . Details of construction and other data on vibrating screens are given in Bulletin 1470-A. May we send you a copy?

ALLIS-CHALMERS

Allis-Chalmers Manufacturing Company, Milwaukee

When writing advertisers, please mention ROCK PRODUCTS

News of All the Industry

New Incorporations

Kinderhook Sand and Gravel Co., Albany, N. Y., $20,000.

Flint Sand and Gravel Co., Inc., New Orleans, La., 15,000 shares of no par value.

Franklin Lime Products Corp., Newton, N. J., $75,000. L. Vanblarcom, Newton, N. J.

McMaster and Hunter Fluorspar Co., Mexico, Ky. R. C. McMaster and Ford Hunter.

Local Sand and Gravel Corp., Mineola, N. Y., $600,000.

Certified Concrete Co., Wauwatosa, Wis., 250 shares at $100 each. S. L. Fuller, L. Fuller and A. Houghton. To produce ready-mixed concrete.

Hearne Sand and Gravel Co., Inc., Hearne, Tex., $30,000. Lyman W. Perkins, Alex W. Spence and W. D. Eastland.

Ready Mixed Concrete Corp., Indianapolis, Ind., 1000 shares of no par value. H. A. Tutewiler, R. W. Heady and Lucy Jacobs.

Northern New York Sand and Gravel Corp., Glens Falls, N. Y., $5000. B. E. Clother, Glens Falls, N. Y.

Commonwealth Concrete and Building Material Corp., 3800 Archer Ave., Chicago, Ill., $1,000.000. Irwin N. Cohen, K. Korte and D. Greisman.

Louisiana Lime and Stone Co., Bastrop, La., $100,000. E. B. Folse, A. G. McBride, C. I. Bacon, F. W. Howard and John O. Wilson.

Sellersburg Crushed Stone Co., Inc., Sellersburg, Ind., 200 shares of no par value. William J. Ehringer, Lionel Dold, Clifford Allhands and Ernest Davis.

Louisiana Quarry Co., Winnfield, La., $300,000. Rutherford Snow Wilson, 314 Ridgway St., Little Rock, Ark., and Chauncey D. Nichols, 3900 N. McKinley St., Oklahoma City, Okla.

C. Schaeffer and Son, Inc., 4637 Lake Park Ave., Chicago, Ill., 150 shares of no par value. B. Wagner, Maurice A. Levens and L. Halsinger. To deal in stone, brick, etc.

Dailey Asphalt Products Co., Inc., Ft. Wayne, Ind., 1000 shares at $25 each. M. M. Beaver, G. A. Zent, C. C. Hiser and L. W. Dailey. To deal in bulk and block asphalt and asphalt products.

Quarries

New York Trap Rock Corp. is reported to be installing Northern Blower dust-collecting equipment at its Cedarcliff plant in New York.

Greely Stone Co., Russellville, Ky., is equipping a new quarry two miles northeast of the city, reported to have a capacity of 1000 tons of stone per day.

Knoxville, Tenn.: The State Highway Commission is reported to have approved a 10-year lease of the Biagiotti quarry near McMillan station. The commission had attempted to buy the quarry but was unable to do so.

Premier Granite Co., Llano, Tex., has purchased the quarry properties of the Painted Horse Granite Co., near Llano, and will carry on an expansion program for the quarrying and production of dimension stone.

Sand and Gravel

Fillmore Rock Co., Fillmore, Calif., recently installed a new jaw crusher and is expanding the output of its plant at Fillmore, Calif.

Ogden, Utah. The city has refused permission any longer for the removal of sand and gravel from the city pit northeast of the cemetery.

Natrona Sand Co., Tarentum, Penn., is planning to make shipments down the Allegheny river in barges to compete with locally produced material.

Nueces River Sand and Gravel Co., Corpus Christi, Tex., has been awarded $9000 in a complaint against the city for damage to its gravel pit below the La Fruta dam.

Independent Gravel Co., Carterville, Mo., suffered a loss estimated at approximately $2000, on March 10, when part of its plant was destroyed by fire.

West Penn Sand and Gravel Co., Pittsburgh, Penn., has received a federal permit to construct a movable bin at Glenwillard, 14.2 miles below the head of the Ohio river. This bin is to be removed on or before December 31, 1931.

Victory Sand and Stone Co., Topeka, Kan., has been refused permission to locate a sand and gravel dredge one-half mile above the city water works intake, for fear that the channel in the river to the intake would be fouled through the operation of the plant.

Putnam Sand Co., Salina, Kan., has brought suit for $5225 against L. W. Rexroad and the Southern Surety Co. of New York City, alleging Rexford, a contractor, and the surety company have failed to pay for material furnished for curbing and guttering in Salina.

Foster O. Spencer and **Clarence L. Holt**, owners of a gravel plant at 7550 Beverly Blvd., Los Angeles, Calif., have been charged with operating a "nuisance" by one of their neighbors who happens to be an attorney and who claims his rest is disturbed by the noise.

Rock Island Sand and Gravel Co., Rock Island, Ill., has purchased a tract of land in the west end of the city of Davenport, Iowa., which is said to contain an extensive gravel deposit, adjoining its present plant in that city, which has been in operation for several years.

Cement

Monolith Portland Cement Co., Laramie, Wyo., is reported to be in full operation after the winter shut-down.

La Tolteca cia de Cemento Portland, Mexico City, is installing Northern Blower dust-collecting equipment at its new plant near Mexico City.

Universal Atlas Cement Co., Waco, Tex., reported to have resumed operation with a full crew, had been operating at part capacity for several months.

Marquette Cement Manufacturing Co., Chicago, is reported to be installing Northern Blower dust-collecting equipment at its St. Louis, Mo., and Memphis, Tenn., packing plants.

Marquette Cement Manufacturing Co., Cape Girardeau, Mo., is reported to be installing new Bradley Hercules mills in its clinker grinding department.

Dewey Portland Cement Co., Dewey, Okla., is reported to have completed between $200,000 and $300,000 worth of repair and replacement work; reopened recently with its full force after a three months' shut-down.

Missouri Portland Cement Co., Independence, Mo.: Charles Dohogne, an employe of the John V. Boland Construction Co., engaged in working on the stack at the mill recently, lost his life by falling from the top of the stack into its exterior.

Yosemite Portland Cement Corp., Merced, Calif., is reported to have resumed operations March 9, after a partial shut-down dating from December 24.

Olympic Portland Cement Co., Bellingham, Wash., is reported to have resumed the shipment of rock from its Kendall quarry to its Bellingham plant on March 5.

Pacific Coast Cement Co. will open its steamship service to the Dall Island limestone quarry on April 1 when the steamer Diamond Cement will start on its first trip of the season. The ship had been operating up to February 1 of this year when a sufficient quantity of rock was on hand to keep the plant operating.

Manitowoc Portland Cement Co.: The safety meeting held recently in Manitowoc gave employes the privilege of listening to a very entertaining address by Prof. W. C. Hewitt of the Teachers College at Oshkosh on the subject of "Humor." William Powell, safety director of the Medusa Portland Cement Co., of which the Manitowoc company is a subsidiary, spoke briefly on the splendid safety record of the Manitowoc plant.

Obituaries

John W. Clarke, owner of the Clarke quarries, Lower Providence, Penn., died March 11, aged 77 years. He is survived by a wife and several daughters and a son. The Clarke quarries were operated by Mr. Clarke for many years and recently were leased to Michael Garber of Norristown.

Charles F. Meyer, for many years a director of the Mid-West Rock Products Corp., Indianapolis, Ind., but recently retired from active association with the company, died recently at his home in Indianapolis. He was 78 years old. He was prominent in Masonic circles for many years.

Charles Sanford Knight, Jr., sales manager of the Electrical and Wire Rope Division of the American Steel and Wire Co., Chicago, Ill., died March 11. He was born in Worcester, Mass., June 15, 1864, and began his business experience with the wire industry when 14 years old with the Washburn-Moen Manufacturing Co. of Worcester, which was subsequently acquired by the American Steel and Wire Co. He was a member of numerous clubs and associations. He is survived by his widow and one son, and was a brother of the late Rear Admiral Knight of the United States Navy.

Personals

Stephen Stepanian, vice-president and general manager of the Arrow Sand and Gravel Co., Columbus, Ohio, was a recent guest speaker at a luncheon held under the auspices of the Ohio Valley Shippers Advisory Board, Columbus.

Frank M. Mardt, vice-president of the Fidelity-Philadelphia Trust Co., was recently elected a director of the Warner Co., Philadelphia, to succeed W. J. Wright. **John L. Steele** of Wm. Steele and Sons Co., Philadelphia, was elected a director of the Warner Co. to succeed the late E. A. Steele.

T. S. Perkins has been made executive head of the newly formed merchandising department of Westinghouse Electric and Manufacturing Co., Pittsburgh. He will represent S. M. Kintner, assistant vice-president, in his work with supply, appliance, refrigeration and illuminating engineering departments.

John Southern has been appointed general manager of Worthington-Simpson, Ltd., of Great Britain. For several years Mr. Southern was supervisor of American built Rolls-Royce automobiles at Springfield, Mass. He is a native of England. He will represent Worthington Pump and Machinery Corp. interests in Great Britain.

Walter W. Bertram

Walter W. Bertram has been appointed sales manager of the industrial chain division of the Morse Chain Co., Ithaca, N. Y. Mr. Bertram, who has been with the company for 18 years, has been manager of the New York office for the past eight years. In announcing Mr. Bertram's appointment, Vice-President Thompson also announces the appointment of **A. B. Wray**, former sales manager, to the position of chief engineer in charge of all industrial chain engineering.

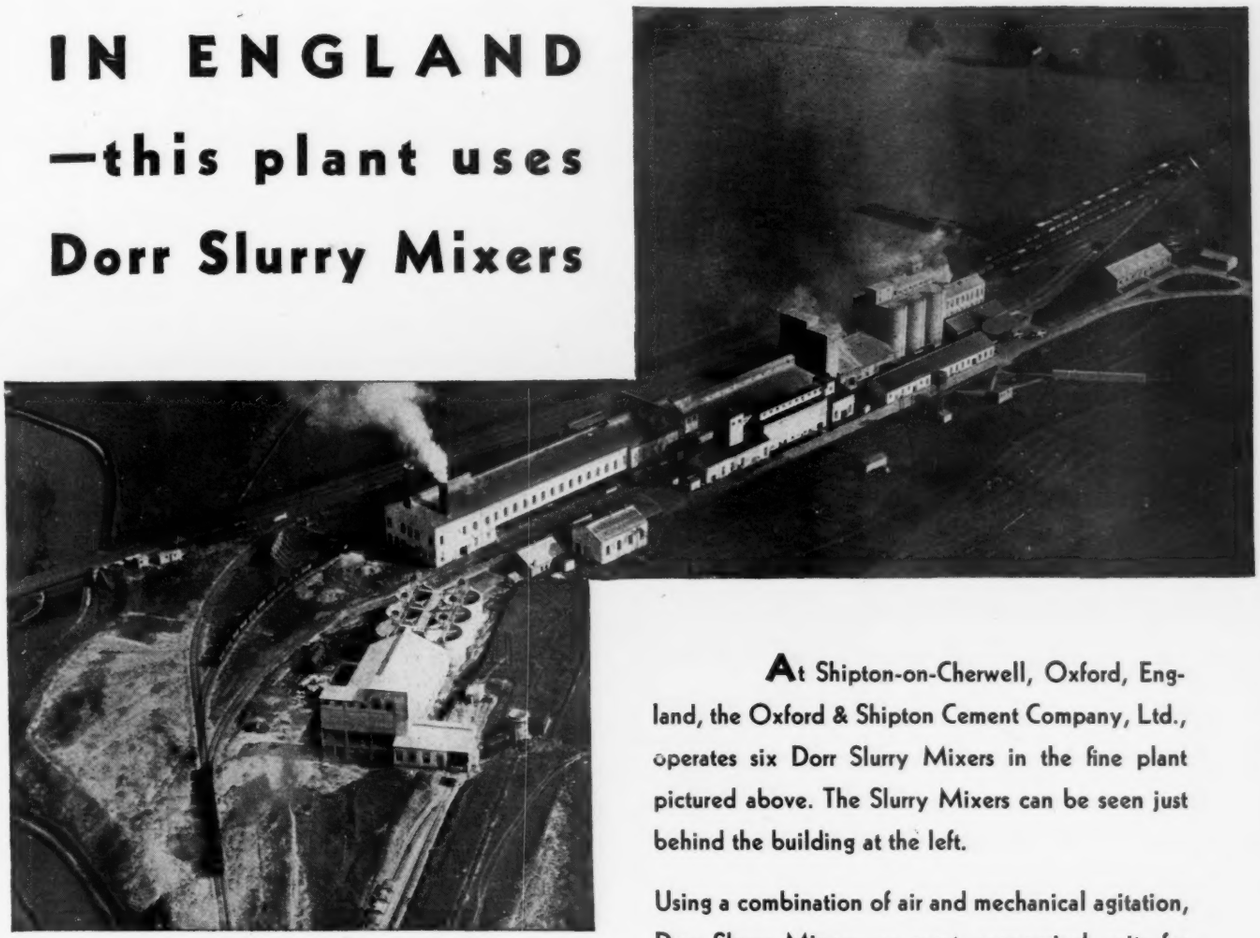
H. S. Covert, formerly of Harriman, Tenn., has succeeded E. L. Osborne as general manager of the Knoxville Sand and Lime Co. Mr. Osborne remains president of the company, Mrs. Milton McDermott is vice-president and R. O. Bryan is secretary and treasurer. Mr. Covert has had many years' experience in the building material industry. He was formerly connected with the Thomas Moulding Brick Co.

C. W. Stone, who for years has been sales manager for the Florida Crushed Stone Co., with offices at 306 Bosphorus Ave., Tampa, Fla., has resigned his position, effective April 1. Mr. Stone is leaving Florida early in April for California, where he will take an active part in the development of some mining property in which he is interested. His successor has not as yet been announced.

Thomas G. Gannon has resigned from the Worthington Pump and Machinery Corp. after more than eleven years of engineering service in the centrifugal pump sales division at the Harrison works. On leaving the corporation, Mr. Gannon was presented with a gift, the tools of his profession, as a mark of esteem and affection from his immediate associates.

John H. Kelly has joined the Thermoid Rubber Co. of Trenton, N. J. Mr. Kelly has a long record of experience in this line, having started with the B. F. Goodrich Co. in 1898, from which connection he went to the Republic Rubber Co., where he rose to vice-president in charge of sales by 1912. Later he became president of the Hewitt Rubber Co., and when this organization entered the Gutta Percha Rubber Manufacturing Co.-Robins Conveying Belt Co. merger, he assumed the vice-presidency in charge of sales. In 1928 he was forced to retire from active duty due to a serious illness, and has since been doing special counselling work.

IN ENGLAND —this plant uses Dorr Slurry Mixers



At Shipton-on-Cherwell, Oxford, England, the Oxford & Shipton Cement Company, Ltd., operates six Dorr Slurry Mixers in the fine plant pictured above. The Slurry Mixers can be seen just behind the building at the left.

Using a combination of air and mechanical agitation, Dorr Slurry Mixers are most economical units for your storage and correction basins. They maintain a uniform mix throughout the whole basin. There is no stratification. And, on account of their distinctive design features, power required to operate the Mixers is usually less than 1 H. P. per 1,000 cu. ft. capacity.

Another special feature of Dorr Slurry Mixers is a trouble-free, non-plugging type of air nozzle.

We will be glad to send cement mill men further information about these dependable Slurry Mixers. Ask our nearest office for Bulletin 1181.

DORRCO

Have you investigated the most modern method of grinding raw materials—the Dorr closed circuit grinding system? Write for details.

DENVER, COLO. 1009 17th Street
CHICAGO, ILL. 333 North Michigan Avenue
LOS ANGELES, CAL. 108 West 6th Street
WILKES-BARRE, PA. Miners Bank Building
ATLANTA, GA. 1503 Candler Building
TORONTO, ONT. 330 Bay St.

THE DORR COMPANY

ENGINEERS

247 PARK AVENUE NEW YORK CITY

INVESTIGATION TESTS DESIGN EQUIPMENT

MELBOURNE, AUSTRALIA
Crossle & Duff Pty., Ltd., 360 Collins Street

TOKYO, JAPAN
Andrews & George Co., Inc., 5 Shiba Park, Shibaku

LONDON
The Dorr Company, Ltd.
Abford House, Wilton Rd., S. W. 1

BERLIN
Dorr Gesellschaft m. b. H.
Kielganstr, 1 W. 62

PARIS
Societe Dorr et Cie
26 Rue de la Pepiniere

JOHANNESBURG, S. A.
E. L. Bateman
Locarno House

Recognized the World Over as the Leader in Its Field

Rock Products

With which is Incorporated CEMENT and ENGINEERING NEWS Founded 1896

Entered as second-class matter, July 2, 1907, at the Chicago, Ill., postoffice under the Act of March 3, 1879. Copyrighted, 1931, by Tradepress Publishing Corporation

Contents for April 11, 1931

Newest Crushed Stone Operation in the South.....**25-33**

Weston and Brooker Co. has put results of many years of engineering and operating experience into new plant at Camak, Ga.

Electric Furnaces for Fused Cement.....**34-38**

First informaton available in this country on the manufacture of high alumina cement in electric arc furnace.

Lime Production Methods of Europe and America **39-46**

Part III—In which is given a genealogy of the earth and data on the origin of limestones. By Victor J. Azbe.

Gypsum and Gypsum Products Manufacture.....**47-49**

Part IX—The manufacture of Keene's cement. By S. G. McAnally.

Sand and Gravel Production of Memphis, Tenn...**50-53**

Well systematized; Diesel engines largely used; recent improvements made. By Earl C. Harsh.

Researches on the Rotary Kiln in Cement Manufacture **54-57**

Part XVI—Uses of high-grade and low-grade heat. The entropy of cement formation. By Geoffrey Martin.

Brief Survey of Rock Products Activities in Florida, Alabama and Mississippi.....**58-63**

By Walter B. Lenhart.

Observations on Manufacture of Cement from Materials High in Sulphur Content.....**64, 65**

By Alton J. Blank.

Crossroads of Industry..... **68**

An editorial from Engineering News-Record.

Safety Meeting of Cement Manufacturers in Kansas City District.....**78-81**

Photoelectric Cell Finds Application in Ready-Mixed Plants **91-93**

Departments

Chemists' Corner **64, 65**
Hints and Helps for Superintendents.....**66, 67**
Editorial Comment **69**
Financial News and Comment.....**70-73**
Traffic and Transportation.....**74-77**
Safety Campaigns **78-81**
Foreign Abstracts and Patent Review.....**84, 85**
Cement Products **87-89**
New Machinery and Equipment.....**94, 95**
Rock Products Market.....**96-99**
News of the Industry.....**100, 102**
Classified Directory of Advertisers.....**110-116**

(Rock Products is indexed in the "Industrial Arts Index," which can be found in any Public Library)

TRADEPRESS PUBLISHING CORPORATION
542 South Dearborn Street, Chicago, Illinois, U. S. A.

W. D. Callender, President; N. C. Rockwood, Vice-President; C. O. Nelson, Secretary

LONDON OFFICE: Dorland House, Mezzanine Floor, 14 Regent St., S.W. 1.

NATHAN C. ROCKWOOD, *Editor and Manager*
EDMUND SHAW, Los Angeles, Calif., *Contributing Editor*
EARL C. HARSH, WALTER B. LENHART, *Associate Editors*
A. M. STERN, *Assistant Editor*
RALPH C. SULLIVAN, *Advertising Manager*
E. A. SINE, *Production Manager*

FRED S. PETERS, *Eastern Manager*
E. H. PAULI., *Eastern Representative*
280 Madison Ave., New York City. Tel. Caledonia 5-4474
GEORGE M. EARNSHAW, *Central Advertising Manager*
1374 West Blvd., Cleveland, Ohio. Tel. Woodbine 8031
NORMAN BOGGS, C. L. WALKER, *Western Representatives*
Chicago. Tel. Wabash 3714-3715

SUBSCRIPTION—Two dollars a year to United States and Possessions. Three dollars a year to Canada and foreign countries. Twenty-five cents for single copies

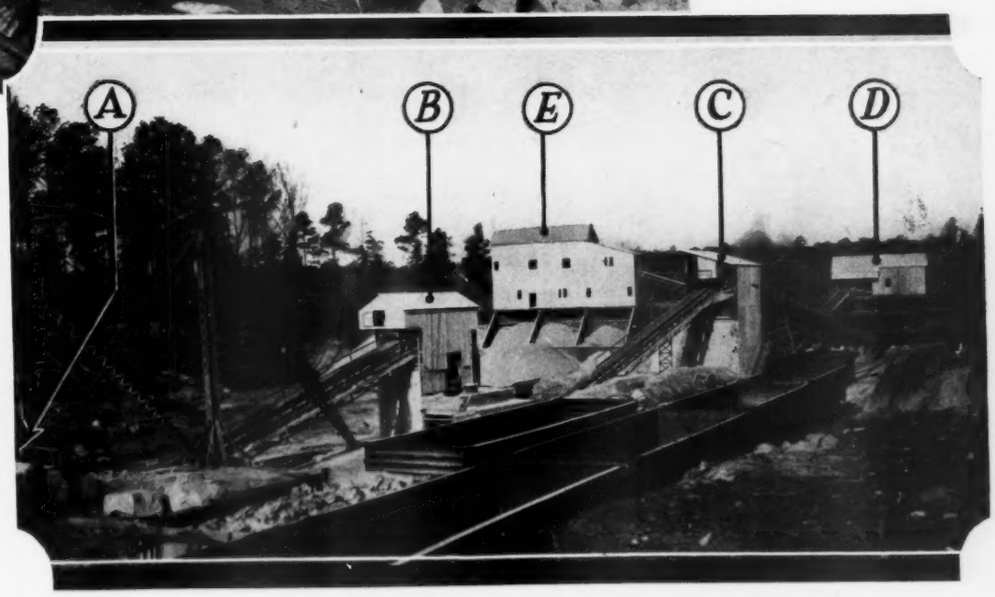
TO SUBSCRIBERS—Date on wrapper indicates issue with which your subscription expires. In writing, to have address changed, give old as well as new address

Rock Products
With which is Incorporated CEMENT and ENGINEERING NEWS Founded 1896

Volume XXXIV | Chicago, April 11, 1931 | Number 8

Newest Crushed Stone Operation in the South

Weston and Brooker Co. Has Put the Results of Many Years' Engineering and Operating Experience into New Plant at Camak, Georgia



(A) Primary crusher. (B) Secondary crusher. (C) Finishing. (D) Scalper screen and loading. (E) Screen house and storage

THE FIRST QUESTION that occurs to a visitor is how this granite deposit came to be discovered, for there is no evidence of it in the surrounding landscape. The country is rolling, and where farming can be done, a little cotton is raised, but for the most part it is a rather barren area with a few small towns connected by improved dirt roads.

The firm of Weston and Brooker, well-known and experienced operators of granite quarries in South Carolina, sensing a demand for crushed hard stone in eastern Georgia, made a very thorough search of the countryside for a near outcrop of granite which, they were convinced, must exist. The granite that they have uncovered and are developing at Camak, Ga., is not only of excellent quality for commercial crushed stone, meeting all state and federal specifications, but it is so situated that the operators are able to serve a large market area through the Georgia Railroad, which has lines radiating in seven directions from or near Camak.

The quarry is about five miles due east of Camak, and the territory reached includes not only eastern Georgia but western and southern South Carolina.

The rock is a coarse-grained granite resembling the other Georgia granites in the Lithonia, Rock Chapel and Stone Mountain districts near Atlanta and undoubtedly could be quarried for dimension and monumental stone.